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## **Can Cash Transfers Promote the Local Economy?**

**A Case Study for Cambodia**

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## **INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE**

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## ABSTRACT

Providing the poorest with safety nets and some form of social protection is becoming part of the agenda of the majority of developing countries. And while cash transfer programs started 15 years ago with experiments and pilot projects, there is currently a scaling up of policies in many parts of the developing world. These policies involve large financial flows which are likely to impact markets, employment and prices.

While previous research on cash transfer programs has primarily concentrated on micro-economic effects, this paper analyzes general equilibrium effects of social transfer policies using a computable general equilibrium model applied to Cambodia. It identifies the potential impact of these transfers on the local economy, looking particularly at prices and market responses to an increase in demand through production and trade. Our findings show that, for goods and services for which domestic supply is not elastic enough to respond to a significant rise in demand, prices will increase, affecting the value of transfers on poverty reduction. However, productivity gains from the health and education component of conditional cash transfers appear to be likely to mitigate the price effects associated with cash transfers alone. Our simulation results also show strong complementarities between social protection and rural development policies. At a given level of public spending, a combination of these two types of policies is likely to generate more poverty reduction than cash transfers alone, while also significantly benefiting the local economy. The results indicate that in the context of weak market integration and insufficient supply response, cash transfers would be more effective if embedded in development strategies that improve trade and domestic production. Social protection programs could therefore become more effective when implemented simultaneously with productivity-enhancing policies.

**Keywords:** cash transfers, policy impact evaluation, social protection policies, Cambodia, general equilibrium analysis, agricultural development policies, price effects

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# 1. INTRODUCTION

Providing safety nets to the poor is part of the agenda of most developing countries. When poverty incidence is high, providing a significant share of the population with social transfers implies substantial mobilization of resources for the government. It also implies that a large injection of funds will flow into the economy and reach a population that will mostly consume the transfers they receive. This surge in households' consumption will increase demand for all sorts of goods and services and will have varying economic impacts depending on whether it reaches markets that have the elasticity needed to respond efficiently and rapidly enough to prevent prices from increasing.

Lack of market integration, which is characteristic of remote areas and rural villages where social protection programs are particularly needed, implies that such a rise in household demand for goods and services could generate price effects and hence compromise the benefit of the measure for both recipients, whose real income might not increase as expected, and nonrecipients, who will see their purchasing power affected. Rising prices may also induce increased imports, thereby lessening the potential benefit to domestic producers which is often mentioned in relation to the economic impact of social transfers (Barrientos 2012; Dercon 2011). Such risks could therefore potentially reduce the efficiency of cash transfer policies.

From the point of view of policymakers with limited, typically scarce, funding capacity, it is essential to understand what economic impact social protection is likely to have on prices and on the local economy where such measures are likely to be carried out. Implementing such policies in the context of countries with high poverty incidence implies a major fiscal effort, and governments usually require evidence-based analysis of what impacts to expect not only for the targeted households but also for nonbeneficiaries, and not just on poverty but also on their local markets, their productive sectors, and eventually even their economic growth.

Since pilot projects were implemented early in the first decade of this century, research on social protection has mainly focused on its impact at the level of households, through their behavior and decisionmaking. As discussed below, very few studies have analyzed or empirically tested the impact that social transfers are likely to have on the local economy. Cunha, De Giorgi, and Jayachandran (2011) considered the price effects that could result from an increase in demand that works through local markets when such measures are implemented. Filipinski and Taylor (2012) used *ex ante* analysis and simulation tools to trace the potential impact of transfers throughout a village economy. These two studies are the only research, to the best of our knowledge, which have looked at the impact of social transfers on markets and prices. While their methodology is similar to that of the present study in many respects, Filipinski and Taylor (2012) investigated the microeconomic impact of projects, that is, the impact at the village level. However, projects are not policies, and the impact of cash transfers on domestic markets is likely to be different at a larger scale than in village experiments, for example. It is also likely to be larger if social transfers are sustained over time.

This paper analyzes the potential economic impact that social protection policies might have on an economy with market imperfections and weak market integration between its surplus and its deficit regions. It illustrates, with the case of Cambodia, why cash transfers might induce price effects that could reduce the efficiency of the policy, and it calls for complementary measures to benefit both recipients and the domestic economy. The paper provides an analytical framework that allows tracing and measuring throughout the local economy the impact social transfers are likely to have on an economy with weak market integration. It uses a computable general equilibrium (CGE) model tailored specifically to simulate conditional cash transfers (CCT) and unconditional cash transfers (UCT). The model represents the economy at a given point in time and allows analysis of policy impacts, *ex ante*, on prices, production, employment, wages, and trade. Comparing simulation results allows consideration of potential tradeoffs and complementarities of different policies.

The case study is based on Cambodia, for which we tailor the IFPRI standard CGE model (Lofgren, Lee Harris, and Robinson 2001). Using data and results from an exhaustive Cambodian socioeconomic household survey, we use a household classification that serves the purpose of our targeting strategies.

This study proceeds in two stages. First, it uses the general equilibrium model to trace the economic impact of cash transfers in a developing economy with a large poverty incidence. It discusses the economic distortions that could result from these policies and explains why social protection measures are likely to have different impacts on prices, trade, and domestic markets than small-scale cash transfers projects. It analyzes results at the level of households and markets in terms of prices, production, employment, investment, and changes in gross domestic product (GDP). It finds that cash transfers are likely to generate price increases on local markets.

In a second stage, the paper looks at a range of investment policies that have been proven efficient to counteract this kind of economic impact and discusses their relevance in the context of this case study. It shows that beneficial complementarity exists between social protection and investment strategies that are specifically focused on growth. This result means that combining cash transfers with targeted public investment is likely to significantly stimulate the domestic economy and generate better outcomes in terms of poverty reduction than each measure separately.

While the literature on social protection provides a few empirical studies on the impact of transfers on prices and the domestic economy, as the next section of the paper discusses, this research relates to other areas of the literature as well. The literature on cash versus food transfers explains why, in some areas and villages with insufficient domestic supply of agricultural products, food transfers might be more efficient than distribution of cash to meet household food needs (Basu 1996; Ahmed et al. 2007; Coate and Zeckhauser 1994; Coate 1989). In relation to famines, Ravallion (1987) analyzed the role of food markets and institutions during several historical famines episodes. Looking at the 1974 famine in Bangladesh in particular, he tests the determinants of increases in the price of food staples using a model of spatial market integration. He shows that social and physical infrastructure are major determinants of famines and have to be accounted for in policy response.

The structure of this paper is as follows. The second section reviews the literature and evidence on the economic impact of social protection in developing countries. Section 3 presents the Cambodian economic background and justifies the need for an efficient social protection system. It then presents the methodology and justifies the choice of using a CGE model. It explains how we tailor standard models of this type to (1) take into account the characteristics of the Cambodian economy, (2) allow for household targeting strategies relevant to the poverty and vulnerability characteristics of the Cambodian population, and (3) allow for simulation of the policies at the core of the study. Section 4 presents and analyzes the results from simulations of cash transfer measures. It analyzes the economic distortions that are generated, considers the channels through which they operate, and discusses their policy implications. It then discusses measures that could prevent these effects from occurring and runs a new set of simulations that combine them with cash transfers. The paper concludes by summarizing the policy implications of the simulation results, looking at what the limitations of this type of analysis are and whether the findings can be relevant to other countries.



## 2. THE POTENTIAL ECONOMIC IMPACT OF SOCIAL TRANSFERS

An abundant and rich literature demonstrates the positive effects of transfers on consumption and nutrition for beneficiaries (Martinez 2005; Coady 2003; Hoddinott, Skoufias, and Washburn 2000; Skoufias 2001; Behrman and Hoddinott 2000; Hoddinott and Skoufias 2004, Rawlings and Rubio 2005), on their health (Gertler 2000), and on their children's schooling (Schultz 2000). Analysis of their economic impact on local economies is thin (Barrientos and Sabates-Wheeler 2010).

Economic growth is often mentioned in policy reports and research papers (Andrade, Soares, Lal and Roy 2010 in reference to the potential positive local impact of social transfers, mainly through an increase in investment and for helping address liquidity constraints and credit market failures. Investment is only one component of the domestic economy, however, and the impact on other components might be larger and especially significant when measures are implemented at the national scale.

The lack of empirical studies of this type can be explained by the difficulty of analyzing the impact on markets of measures that have so far mostly been implemented on a small scale (through experimental projects and aid-funded programs rather than national policies) and with the household as a main analytical focus.

A few studies have, however, succeeded in identifying and measuring specific economic impacts from social transfers, either on nonbeneficiaries or on a particular economic aspect of the local economy. Barrientos and Sabates-Wheeler (2010) looked at the local-economy effects of cash transfers, using data from PROGRESA in Mexico, by comparing welfare of nonbeneficiaries in control and treatment areas. While this study was innovative and rich in results, it did not trace the channels through which direct and indirect economic impacts operated in the economy as the result of social transfers. It did not use market, price, and employment data to analyze the potential economic impact of PROGRESA on the local economy, while it acknowledges the difficulty of identifying the direct causal link between the observed welfare and the transfer itself.

Sadoulet, de Janvry, and Davis (2001) conducted a similarly innovative study on beneficiaries of the PROCAMPO program in rural Mexico. They estimated an income multiplier for investment made from transfers received by small farmers, who were liquidity and credit constrained. The multiplier was found to be significant and relatively substantial for the richest recipients, who were able to divert part of the transfers from household consumption. However, the authors explained that the surge in consumption could create distortions in markets, including inflation and an increase in the real exchange rate, that even a good multiplier operating on a small (possibly marginal) part of the productive sectors might not succeed to offset.

Another interesting approach to estimating the economic impact of cash transfers through investment comes from Gertler, Martinez, and Rubio-Codina (2006), who found that cash transfers from the Oportunidades program in rural Mexico relieved liquidity and credit constraints for some households and led to investment of about 12 percent of the transfer received into microenterprise and agricultural activities. The good return on investment from this source generated new income and thereby improved the consumption and long-term living standards of the beneficiaries. The same point about liquidity constraints can be found in Palacios and Sluchynsky (2006), who reviewed social pension programs across developing countries. Similarly, Delgado and Cardoso (2000) explained how the regularity, predictability, and liquidity of pension benefits allowed rural households in Brazil to generate investment that led to surplus from productive agricultural activities.

In an exhaustive and more systematic way, Dercon (2011) and Barrientos (2012) reviewed the possible impacts of social protection on the domestic economy, looking at potential effects, respectively, at the household level through household liquidity constraints, savings, and investment in productive assets, and from a labor market point of view through human capital and migration effects. While these two papers are key contributions to the debate and offer an exhaustive review of the potential economic impacts that could be conducive to growth, they remain mostly theoretical, lacking empirical evidence and considering impacts from a partial equilibrium perspective.

While all of these papers have demonstrated and sometimes measured isolated impacts that are potentially conducive to economic growth (such as credit constraints and investment), their methodology has not allowed analysis and measurement of the impacts of these policies on prices, domestic producers, and the local economy. Nor have they allowed for assessing the potential risk associated with scaling up programs to policies in the context of a country with high poverty incidence, because doing so would require a general equilibrium framework that takes into account national markets and households simultaneously.

Moreover, these studies have been done for a handful of Latin American countries whose economic context is different from that of the majority of developing economies with pockets of poverty in isolated areas, market failure, high transport costs, and weak market integration. The applicability of these Latin American studies for parts of the world with high poverty incidence and a need for substantial social protection policies is probably limited.

The risk of distortions on domestic markets leading to significant price increases that could be detrimental for the purchasing power of the poor (beneficiaries or not) has been discussed in three articles. Dercon (2011) explained that social protection should not be seen as a driver for growth and that cash transfers present the risk of inducing price increases without any other benefit for the economy if they are not complemented with productivity increases. Both assumptions are precisely the focus of the present paper and are supported by its results. Discussed through the lens of the cash versus food transfer debate, the empirical study carried out by Cunha, De Giorgi, and Jayachandran (2011) demonstrated that a program implemented in Mexico beginning in 2004, called Programa de Apoyo de Alimentario, did generate such price effects. Using a randomized controlled trial, the authors found significant price effects from cash transfers on the local economy in remote villages, compared with in-kind transfers. They concluded by recommending that governments should alleviate supply constraints in poor villages and combine cash transfers with alternative supply-side policies. Both hypotheses are evaluated in the present paper.

Filipski and Taylor (2012) generated ex ante simulations using a village economy model applied to Ghana and Malawi. They traced the impact of cash transfers on local markets through productive impact, investment, and prices across sectors. Their study demonstrated the difference between the potential real and nominal impacts of the measure. Although the authors assumed fixed prices for tradable goods and a perfect elasticity of supply, their results still indicated a potential increase in the local current price indexes in the treated villages, where they found a significant difference between the real and nominal income multipliers.

Results from both Filipski and Taylor (2012) and Cunha, De Giorgi, and Jayachandran (2011) confirmed the relevance of a general equilibrium analysis of the impact social transfer policies might have on markets and prices, and the need for an assessment in real rather than nominal terms, not as a substitute for but as a complement to other evaluation methods.

### 3. AN ANALYTICAL FRAMEWORK FOR CAMBODIA

#### Background on Cambodia

Cambodia achieved an average 8 percent annual economic growth between 2000 and 2010, and its share of population living below the poverty line fell from 48 percent in 1994 to about 30 percent in 2007 (World Bank 2012). Non-income indicators such as ownership of consumer durables, housing quality, and access to electricity, social services, and schooling indicate a relative improvement in living standards at the national level (Steer, Levy et al. 2010). These gains reflect the economic and social development that has been made possible since the early 1990s, when Cambodia embarked on a major transition from civil war to peace, from one-party to multiparty politics, and from an isolated and subsistence-oriented economy to one based on the market and open to international trade.

However, the main engines of growth over the last decade (garment manufacturing, tourism, and construction) were essentially urban-focused, with few economic links to the rural economy. The textile and tourism industries are export-oriented and therefore more vulnerable to variation in the international demand. The base for growth is narrow, with low labor productivity appearing as a binding constraint for private-sector development (World Bank 2009).

With an average annual per capita income of \$2,260 in purchasing power parity (PPP) in 2011, Cambodia remains one of the poorest countries in East Asia (compared with \$6,623 and \$8,240 in PPP on average in neighboring Vietnam and Thailand, respectively). It is also one of most unequal, with a Gini coefficient of 0.44 in 2007. Part of the recent growth in inequality has been due to widening differences between urban and rural areas, but part is also attributable to considerable variation in the rate and distribution of growth among rural localities. According to the 2004 Cambodian Socio-economic Survey, or SES (Cambodia, NIS 2005a, 2005b), poverty incidence reached almost 40 percent in rural Cambodia, where the population has limited access to basic social services, markets, and transport infrastructure. The provision of rural health and education services is still largely insufficient to address the population's needs (Steer, Levy et al. 2010).

The 2009–2013 National Strategic Development Plan provided a medium-term strategy for poverty reduction, with increased emphasis on agricultural investment, and set the improvement of productivity in the agricultural sector as a major priority. However, the provision of basic rural infrastructure and services to agriculture remains weak. The almost total absence of financial services in rural areas prevents producers from taking advantage of production and investment opportunities. The functioning of rural markets is hindered by the lack of transport infrastructure. The rural poor face a number of interlocking problems (Engvall, Sjöberg, and Sjöholm 2008), most importantly the lack of secure land tenure, but also remoteness from markets and services, lack of productive assets, low levels of education, and high dependency ratios.

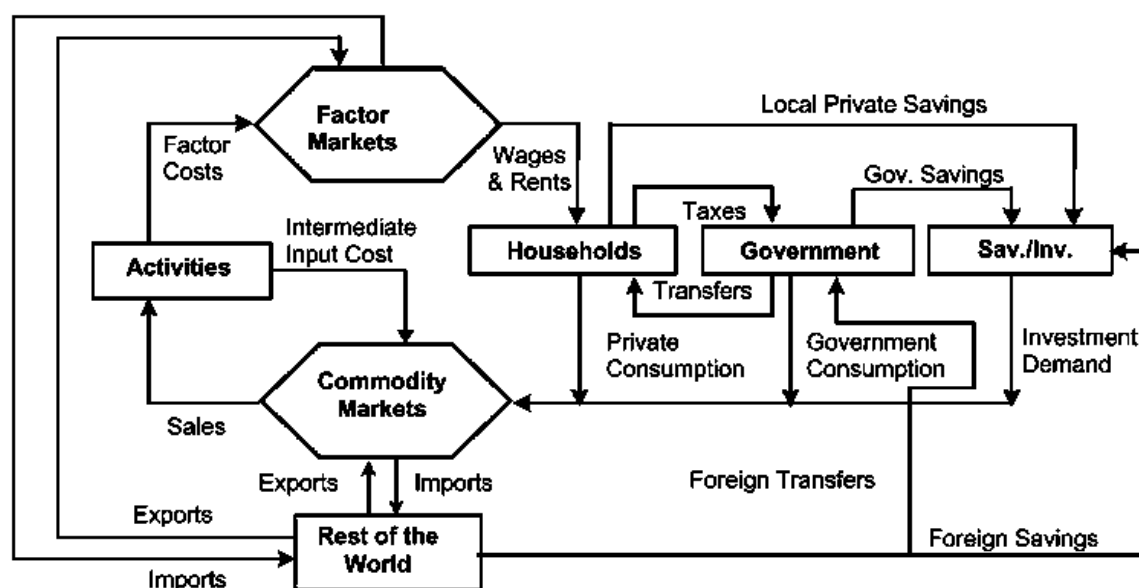
Policy discussion around wider social protection (other than food distribution, which is relatively well established) has recently started to emerge through the National Social Protection Strategy (NSPS). This strategy aims at combining and reinforcing existing efforts to target the poor with health, education, and food aid programs. The NSPS aims at linking these benefits into a coherent policy program that will include social safety nets and both cash and in-kind transfers. The policies that are currently studied and considered by the government are replicated in the present model, although their size is still hypothetical.

We use a CGE model to assess economic impacts of social protection policies on domestic markets and potential complementarity or synergies with agricultural growth policies.

## A CGE Approach

CGE models represent a national economy through the annual resource and commodity flows among different economic agents across markets. These models are built on a set of equations that represent the behavior of these agents and the economic or financial relationships that link them. Figure 3.1 provides a simplified picture of these links. These equations are estimated empirically by calibration methods using a social accounting matrix (SAM), a dataset that captures all these financial flows for a given year and represents an initial equilibrium for the CGE model. The CGE model provides a simulation laboratory for analyzing the response of the economy to various shocks, generating new equilibrium prices and quantities that can be compared with the base values.

**Figure 3.1 Structure of financial flows in the standard CGE model**



Source: Lofgren (2004).

Notes: The arrows represent financial flows. The model also includes “real” flows (for example, factor services or commodities) that go in the opposite direction from the financial flows across commodity and factor markets.

CGE models support analysis of a large variety of policies or economic shocks. For the purposes of this study, the impact of cash transfers can be captured not only through their direct impact on household consumption and savings, but also through a large range of indirect impacts on markets, factor demands (including labor), and prices. The simulations measure these indirect impacts and trace the responses from sectors and markets that are not directly impacted by the measure, such as the labor market. Most importantly, the model traces indirect price effects working through both domestic and import markets.

## Modeling the Cambodian Economy

The CGE model of the Cambodian economy used in this paper is based on the standard CGE model developed at IFPRI (Lofgren, Lee Harris, and Robinson 2001). The various share parameters in the production, consumption, and trade aggregation functions come from the SAM. The elasticities in the various functions define the substitutability between factors of production as well as the substitution elasticities across commodities in household demand, between domestic and imported goods (the Armington function), and between domestic and exported goods (constant elasticity of transformation, or CET, function). The present model takes standard values for trade elasticities, 0.6 for the CET and the Armington functions, and 0.6 for the elasticity of substitution in the production functions (Table 3.1).

**Table 3.1 Elasticities used in the computable general equilibrium model**

Elasticities	$\phi_i$ (CET function exponent)	$\rho_i$ (Armington function exponent)	$\sigma_l$ (Elasticity of substitution between capital and labor)	$S_k$ (Elasticity of substitution between public and private capital in the agricultural sector)
Value	0.6	0.7	0.6	0.6

Source: Authors' creation.

Note: CET = constant elasticity of transformation.

When the data from the SES were not detailed enough to allow for sector disaggregation, the model used technical parameters on production that had been assessed for the economy of Vietnam as it was in 1998. It therefore used some of the technical parameters from the general equilibrium model for Vietnam that was produced by IFPRI (Nielsen 2002). These parameters were found to corresponded closely with the data on production for Cambodia in 2004.

The closure rules are as follows. For the government balance, the model's closure implies that all tax rates are fixed and that the balance between government revenue and expenditure is made through government savings which are flexible. The closure on external balance, that is, foreign savings and trade balance, is expressed in foreign currency and is assumed to be fixed—the real exchange rate adjusts to ensure equilibrium between aggregate exports and imports. Given the focus of this study and because it aims at testing whether saving and investment resulting from cash transfers stimulate the domestic economy, we use a macroclosure on the capital account, whereby investment is driven by savings. This neoclassical closure implies that investment depends on the sum of public, private, and foreign savings.

The SAM is based on the 2004-2005 Cambodian national accounts in conjunction with the 2004 Cambodian SES (Cambodia NIS 2005a, 2005b and 2006). It distinguishes six economic accounts or "blocks": households, government, the productive sectors, factors of production, the investment and savings account, and the rest of the world.

The productive economy comprises 3 agricultural, 4 manufacturing, and 10 service sectors, including public administration, health, and education. This matrix takes into account informal trade with neighboring economies (which is assessed as a residual between national production, national consumption, and formal trade). It also reflects transfers, formal or informal, that households receive from abroad.

Investment is financed by savings from households, firms, government, and the rest of the world. The government receives taxes on production, profits, exports, and imports as well as transfers from the rest of the world.<sup>1</sup> The revenue is used to pay for its employees' wage bill, public expenditures, and public investment.

There is currently no public social protection program for poor households in Cambodia. Only retirement pensions and small-scale transfers to households are reported in both the 2004 household survey and the government budget as registered in the national accounts. For the present purposes, we assume that social protection programs would be financed either by foreign aid through budget support or by the Cambodian oil and gas revenue and that financial transfers would be directed to targeted households according to their characteristics and ability to engage in the labor market.

Based on the 2004 household survey and for the purpose of the simulation exercise, the model decomposes factors of production into five categories: informal agricultural labor, informal nonagricultural labor, formal labor, agricultural capital, and nonagricultural capital.

It groups households into categories according to their main source of income. By doing so, it also considers household exposure to (1) the food market (that is, whether households are subsistence producers and are able or not to generate a surplus for domestic markets) and (2) labor markets (that is,

<sup>1</sup> These transfers correspond to aid via budget support, technical assistance, and projects.

whether they sell their labor to a commercial farm or to a private firm outside agriculture, or use it to grow subsistence crops).

The model therefore distinguishes six types of households on the basis of their predominant source of income and therefore on their exposure to labor markets:

- Group A: households that are not engaged in productive activities
- Group B: landless farmers who sell their labor force to larger farms
- Group C: subsistence farmers who do not sell their production on the market
- Group D: farmers who sell part of their production on the market
- Group E: households that sell their labor to formal or informal firms
- Group F: traders, entrepreneurs, and clerks

The SES shows that households in Groups B and C, which account for nearly 50 percent of the Cambodian population, have lower-than-average incomes (Table 3.2). According to research on chronic poverty by the Chronic Poverty Research Centre (CPRC 2004), households in these groups are likely to be chronically poor. The SES data especially show that households in Group B are the poorest on average, they typically own no (or very few) productive assets, no land, and sell their labor to larger farms. Households whose main source of income comes from urban labor, formal or informal (Group E), have similar income on average. This classification of households reveals that on average the poorest Cambodians are the rural working poor.

**Table 3.2 Household composition and income**

<b>Group</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>Total</b>
<b>Description</b>	<b>Not able to work or not working</b>	<b>Farmers selling labor</b>	<b>Sub-sistence farmers</b>	<b>Semi-commercial farmers</b>	<b>Urban laborers</b>	<b>Professionals, traders, and clerks</b>	
Number of individuals	494,408	91,349	4,718,521	669,609	887,005	3,239,959	10,100,852
Number of households	123,616	23,977	1,202,705	177,838	255,142	812,160	2,595,438
Numbers of individuals per household	4.0	3.8	3.9	3.8	3.5	4.0	3.9
Average daily individual income in Cambodian riels	5,350	3,405	4,029	4,212	3,731	7,353	5,140
Average daily individual income in US dollars	1.09	0.85	0.99	1.05	1.00	1.83	1.28

Source: Authors' calculation from 2004 Cambodia Socio-economic Survey (Cambodia, NIS 2005a, 2005b).

The average incomes of households in Groups B, C, and E are approximately at the poverty threshold of US\$1 a day. Although there are disparities between the households in this group, and because these extrapolations have been made on the basis of the 2004 household survey, it is difficult to estimate precisely the number of individuals below the poverty line in each category. Looking at these averages can, however, justify the targeting strategy suggested in this study, which appears relevant on the basis of not only household exposure to labor markets but also distance from the poverty line.

The fact that households in Group A have, on average, higher income than the working poor indicates that there is significant heterogeneity among households in this category. Some own assets that generate income such as rent, which implies that they should not be considered as part of the Cambodian poor nor benefit from social protection measures. The 2004 survey data also show that some households in this group receive financial transfers from members of their families or social networks, so that their actual resources or income place them at an intermediate level of poverty. These capital income and financial transfers increase the average income in this group. One would need to know household asset endowments to design a more precise targeting strategy in the model and exclude the households with such assets or networks from Group A. Unfortunately, the necessary data for such distinction were not available. Given this data constraint, and because the rest of the households in this group should be considered as poor and deserve to benefit from social protection, this grouping is considered to be the best available given the study's targeting strategy.

In the model, households receive income from their productive activities and transfers from other households or institutions (that is, government and remittances). They use fixed shares of their total income to pay direct taxes, make transfers to other institutions or households, and save. The share of transfers and the marginal propensity to save are estimated using the Cambodia household survey and the SAM for the base year. Their disposable net income is then used to consume goods and services. We assume that households have a Stone-Geary utility function that is specific to the group they belongs to and that allows deciding how to allocate expenditures across commodities. Given these utility functions, household demand follows a linear expenditure system (LES) as follows.

Household net disposable income is:

$$EH_h = (1 - \sum shii,h) \cdot (1 - TINSh) \cdot (1 - MPS_h) \cdot Y_{Ih} , \quad (1)$$

where  $EH_h$  is disposable income for consumption for households in group  $h$ ,  $shii,h$  is the direct tax rate,  $TINSh$  is the rate of transfers to other households, and  $MPS_h$  is the households' marginal propensity to save.

Household consumption expenditure is:

$$PQ_c \cdot QH_{c,h} = PQ_c \cdot \gamma_{c,h} + \beta_{c,h} \cdot (EH_h - \sum PQ_c' \cdot \gamma_{c,h}), \quad (2)$$

where  $QH_{c,h}$  is the quantity of commodity  $c$  consumed by households in group  $h$  at the market price  $PQ_c$ . We denote  $\gamma_{c,h}^m$  as the subsistence consumption of commodity  $c$  and  $\beta_{c,h}$  as the marginal share of consumption of commodity  $c$  for households in group  $h$ .

## 4. THE RESULTS

The CGE model for Cambodia presented in Section 2 is used to simulate the impact of UCT and CCT. In each of the following simulations (or scenarios), the total amount of public spending used to finance social protection or a combination of social protection and agricultural growth interventions is identical. It corresponds to 2 percent of baseline's GDP.

The model assumes that this funding comes from external sources, such as the Cambodian oil and gas revenue or foreign aid. If these measures were financed by the country's own fiscal resources—that is, by taxing some economic agents such as firms or households—they would be likely to significantly affect the GDP. Preliminary research shows that taxing the private sector will reduce profitability and therefore affect domestic production activities, investment, or both, and slow down economic growth. The objective of this study is to isolate and analyze the economic mechanisms that result from the implementation of social protection measures. In order not to add up and mix the effects induced by funding the measures and the measures themselves, the study assumes that the source of funding is external and ignores administrative costs of distribution.

The following section presents, explains, and quantifies the economic impacts that each measure is likely to generate in Cambodia.

### Unconditional Cash Transfers

The cash transfer measure in this simulation consists of a direct financial transfer to households in Groups A, B, and C (Table 4.1), following the targeting strategy explained in the previous section.<sup>2</sup> The households in each group are targeted individually. The simulation assumes an efficient household identification and targeting, and ignores the administrative cost of implementation for simplification purposes and to isolate the impact of the transfer, which is the aim of the study.

**Table 4.1 Transfer allocation and funding distribution across household groups**

Allocation/Distribution	Group A	Group B	Group C
Initial average daily income per individual (in US dollars)	\$1.09	\$0.85	\$0.99
Transfer received (corresponding amount per year, per individual, in US dollars)	\$18.25	\$95	\$22
Transfer received (corresponding amount per day, per individual, in US dollars)	\$0.05	\$0.26	\$0.06
Corresponding public funding (total, in billion Cambodian riels)	48.6	38.9	412.5
Ratio of public funding received	10%	8%	82%
Number of individuals in group	494,408	91,349	4,718,521

Source: Authors' calculation from 2004 Cambodia Socio-economic Survey (Cambodia, NIS 2005a, 2005b).

The corresponding financial transfer to individuals in each category of households is described in Table 4.1. These transfers allow bringing the beneficiaries above the poverty line, to an approximate average daily income of US\$1.10, over the course of the year. These transfers can be considered as relatively small in size but there are distributed at a very large scale. For comparison, the Zambia Social Protection Program provides incapacitated households with US\$10 a month, paid under the Social Cash Transfer Scheme. The policy simulated here would be equivalent for a household in Group C composed

<sup>2</sup> This choice of targeting strategy implies that transfers are also given to the urban poor (the ones in Group A). In this, the model follows Coady (2003), who also used a CGE model to analyze the impact of PROGRESA in Mexico and showed substantial welfare gains from the expansion of the program to include the urban poor.



of five family members. The transfers would be higher for households in group B and slightly smaller for households in Group A.

The results are shown in Table A.1 in the appendix and summarized in Table 4.2, showing the impact of the measure on some key economic indicators.

**Table 4.2 Aggregate results from simulation of unconditional cash transfers to household Groups A, B, and C (in percent changes from base values)**

Total household income		Income of the poor		Real GDP	Crop production (volume)	Consumer price of agricultural products	Consumer price index
Nominal	Real	Nominal	Real				
3.7%	3.6%	7.4%	7.2%	0%	0.5%	3%	1.6%

Source: Authors' calculations.

Note: GDP = gross domestic product.

These results can be explained as follows.

- Cash transfers increase the demand for goods and services from beneficiaries. Households in Group A consume their new revenue entirely and do not invest any of the cash they receive in productive activities. Households in Groups B and C, on the other hand, do invest a fraction of the cash transferred to them in productive assets.
- This result confirms the most common hypothesis discussed in the literature in relation to the economic impact of cash transfers. According to this hypothesis, transfers are likely to increase investment, even when directed toward the poorest part of the population. In the present simulations, even the households that are further below the poverty line (in Group B) do invest part of the cash transfers they receive, thereby reducing their vulnerability and increasing the prospects of future domestic growth via capital accumulation.
- The impact of this investment on Cambodian real domestic product, however, seems insignificant in these results. Of course, because the model allows looking only at the short-term, immediate impact of cash transfers, it does not offer long-term impact assessment. It can only assume that if social protection is repeated over time and if transfers become predictable, then households' propensity to save might increase and lead to more investment and capital accumulation.
- The other interesting result from this scenario is that the impact of cash transfers on macroeconomic gross product is also insignificant. The surge in demand that is generated by cash transfers does not appear to stimulate domestic production enough to increase the real GDP. The increase in demand for staples is largely satisfied by a redirection of exports (-1.5 percent) to domestic markets and by new imports (+3.5 percent). Many Cambodian productive sectors do not have the capacity to respond to changes in demand as rapidly or cost-efficiently as neighboring markets would. Their supply elasticity appears to be small. International trade, including smuggling, allows domestic prices not to increase as a result of higher demand. Imports prevent price increases that would affect the purchasing power of all those who do not receive any transfer.
- In this scenario, cash transfers appear to fail to generate more poverty reduction than the value of the transfers themselves.

The economic effects observed in these simulations can be compared to an economic phenomenon commonly termed *Dutch disease* in the economic literature (see Gelb 1988 and Barder 2006 for a review). If in-country supply capacity is not reinforced during a trade boom or an influx of foreign aid, exports tend to decline and imports to increase significantly, to respond to the surge in demand.

Prices are then likely to increase, and while the real exchange rate appreciates, the domestic economy tends to become less competitive. This is similar to a small-scale Dutch disease, whereby the economy of a country that benefits from new sources of income (such as oil or aid, for example) does not experience economic growth even though household demand is increasing (Adam and Bevan 2003). In the context of a country like Cambodia, surrounded with relatively more competitive neighboring economies, such as Thailand, China, and Vietnam, the need to complement policies that boost household demand with measures that reinforce its productive sectors and competitiveness is likely to be strong.

Similarly, the results show that cash transfers are likely to create changes in domestic markets, through price increases and through the degradation of the external trade balance. As opposed to what happened in the classic case of Dutch disease, in which wealthy households tended to benefit from the new resource revenue, the beneficiaries of the present social protection measure are at the bottom end of the income distribution. The increased demand resulting from the cash inflows is predominantly for staples and agricultural products, which is why most of the Dutch disease effect appears in the agricultural sector, through prices, production, and trade.

In the case of Cambodia, the economy seems not likely to respond rapidly or adequately to a surge in household demand for consumption goods and services via an increase in production, but rather via an increase in imports and the redirection of exports to domestic markets. Country competitiveness in several key sectors might be weak, as is the ability of some productive sectors to respond to an economic change. In order for the Cambodian economy to satisfy the surge in demand generated by cash transfers, and therefore for the economy to benefit fully from this new opportunity, the Cambodian productive sectors would have to be reinforced and become more responsive. Investments and gains in productivity are needed, particularly in sectors solicited the most by the poor who receive the transfers, that is, the agricultural sectors.

### **Conditional Cash Transfers**

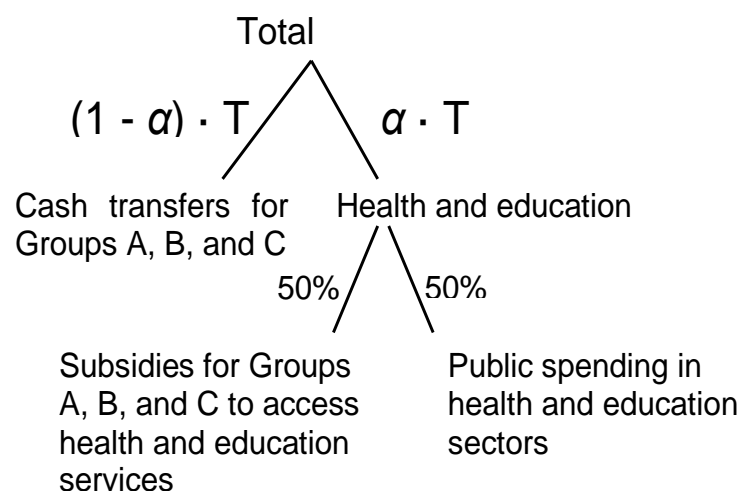
The present scenario uses the same total amount of public funding ( $F$ ) as in the previous simulation and is based on the same household targeting strategy, but it combines cash transfers with subsidies for health and education services. This scenario aims to replicate the impact of CCTs, assuming that the conditionality is binding and effective for all targeted households who prefer using social services over losing their social protection.<sup>3</sup>

Because the provision of public social services is currently insufficient to respond to Cambodian household needs, it is necessary to increase public spending in these sectors at the same time that households' access is subsidized in order for the measure to become effective. Therefore to allow for the supply of public social services to increase and respond effectively to the new demand from beneficiary households, we assume that the health and education component of this scenario consists of a combination of subsidies for poor households and public spending in these two sectors. The funding dedicated to health and education is equally shared between (1) subsidies for households in Groups A, B, and C to access health and education services and (2) public investment in these two sectors, as shown in Figure 4.1.

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<sup>3</sup> The present study does not analyze the determinants of household choice to participate in the program, which is widely discussed in the literature. In order to analyze and isolate what could be the potential economic effects of the health and education component of CCT measures, it assumes that conditionality is a binding constraint to targeted households who chose to join the program.

**Figure 4.1 Allocation of public funding in the simulation of conditional cash transfers**



Source: Authors' creation.

In this simulation, health and education measures affect beneficiary households in two ways: first, these households benefit from free access to part of their health and education consumption and second, the productivity of the beneficiaries who are engaged in productive activities increases, although very modestly. This is to reflect the fact that better access to health services by individuals who work in the agricultural sectors is likely to increase, even marginally, their labor productivity. While we recognize that the impact of increased access to education is likely to increase productivity in the longer term,<sup>4</sup> it is not possible to capture this effect in the present simulation that only offers a short-term analysis. Empirical research indicates however, that it is reasonable to assume that better access to health services (through both better service provision and free access) will increase, in the short term,<sup>5</sup> the labor productivity of beneficiaries when they are engaged in farming activities. Farm work and agricultural production being physically demanding, it seems reasonable to assume that health affects farmers' capacity to engage in their productive activities.

Why farming activities? Given the adopted targeting strategy and the distribution of poverty among the Cambodian population, beneficiaries are either nonworking households (urban and rural) or households involved in agricultural activities.<sup>6</sup> Therefore, the productivity impact will benefit predominantly agricultural labor.

The present simulations are based on existing empirical research both in the way the productivity increase is formalized and in the order of magnitude of the assumed impact. There is a large body of research investigating and measuring the potential impact of health on productivity of farmers in developing countries. Pitt and Rosenzweig (1986) initiated the formalization of these potential effects in a partial equilibrium theoretical model that showed that health improvement will increase the productivity of farmers. The present simulations use the same formalization, although it does not model farmers' choice of leisure versus working time. This assumption is equivalent to stating that farmers have more units of work to use or that each of their units of work is more productive (as opposed to a technological change or a total factor productivity (TFP) increase in the production function).

<sup>4</sup> Because this CGE model allows for a comparative static analysis, as opposed to a long-term dynamic one, the simulations report only on the short-term impact of these interventions.

<sup>5</sup> Commonly with static CGE models, *short term* refers to a one-year period or at most a period during which the structure of the economy is not likely to change.

<sup>6</sup> This is not to say that there are no Cambodian poor outside these groups, but rather that households within these groups appear in the household survey as the poorest, on average, in terms of financial income.

This impact has been measured empirically in the context of many developing economies (see McNamara, Ulimwengu, and Leonard 2010 for a review). Despite great heterogeneity among methods and among findings, microeconomic studies suggest that inexpensive health measures can have a significant, immediate, and substantial impact on labor productivity (McNamara, Ulimwengu, and Leonard 2010).<sup>7</sup> These studies have focused mainly on interventions that aimed at improving nutrition or at fighting diseases. In the studies that are the most relevant to the present work, the productivity impact could be captured either through wages—which are indexed on productivity (Kim, Tandon, and Hailu 1997; Behrman, Foster, and Rosenzweig 1997; Croppenstedt and Muller 2000)—or through agricultural yields (Deolalikar 1988; Strauss 1986 in Sierra Leone; Ayalew 2003; Audibert and Etard 2003; Ulimwengu et al. 2011). Although these authors used different estimation methodologies, they found positive elasticities or returns to health interventions on the productivity of the beneficiaries.

In a large part of this research, health is found to be a determinant of the productive abilities of farmers. Controlling for age distribution among workers and endogeneity of factors, Haddad and Bouis (1992) looked at the short- and long-term effects of the health and nutritional status of farmers in the Philippines. They found that substantial lifetime income losses may be incurred by adults who depend heavily on agricultural wage income. Also in the Philippines, Antle and Pingali (1994) found that farmers' health has a positive effect on their productivity, while illnesses lead to lower productivity due to impaired work capacity in the field and reduced management and supervision abilities. In Mali, Audibert and Etard (2003) found a 26 percent increase in production per family labor person-day for beneficiaries of water-related disease treatment relative to the control group. In Indonesia, Pitt and Rosenzweig (1990) similarly characterized the impact of a change in health on productivity in the labor supply and farmer income, as did Ulimwengu (2009) in Ethiopia. Hawkes and Ruel (2006) developed a conceptual framework of the linkages between health and agriculture, and concluded that a lack of coordination between health and agricultural policies undermines the impact of both measures.

Looking at both health and nutritional status among Ethiopian farmers, Croppenstedt and Muller (2000) estimated a Cobb-Douglas stochastic frontier production function and found that even a small increase in weight for height leads to considerable increases in output, as does distance to the source water (probably through health status of the household and through time diverted from farming). Using a similar approach, Wouterse (2011) confirmed the role of human capital (health and education) in the technical efficiency of smallholder agricultural production in Burkina Faso. Looking at nutritional status in particular, Behrman, Foster, and Rosenzweig (1997) estimated between 0.22 and 0.34 to be the income elasticity of an improved calorie intake by rural Pakistani households, depending on the production stage during which cash supplements were supplied and on the household land endowment. Fafchamps and Quisumbing (1999) estimated at 0.45 this elasticity for farmers' body mass index, also in Pakistan. Calorie consumption has been similarly proven to augment productivity and efficiency in Uganda (Ulimwengu et al. 2011) and in Rwanda (Bhargava 1997), for example.

This literature therefore mostly shows that poor health and poor nutritional status impede the capacity to undertake farming and subsistence tasks. It also reveals a large scope for agricultural productivity improvement through better health and nutrition. Poor health and poor nutritional status appear to be a primary productivity constraint and may induce a loss in output due to technical inefficiency.

The present modelling exercise looks at specific health interventions associated with cash transfers that correspond closely to the ones referred to in this literature: regular visits to the physician and health clinics; supplementation of nutrients (Ulimwengu et al. 2011); and provision of essential medicine, including antibiotics, malaria treatments (Asenso-Okyere et al. 2011; Girardin et al. 2004), and treatments for water-related diseases (Audibert and Etard 2003) and other infectious diseases. As in this

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<sup>7</sup> As this literature review explains, the indicators used for macroeconomic studies (mainly life expectancy) are more likely to be correlated with income, with the causality link becoming far more difficult to establish than when one looks at specific interventions and health programs that target groups of beneficiaries. In the latter case, impact testing would be more straightforward and the causality link could be more convincingly established.

empirical literature, the impact of such interventions on the beneficiary's labor productivity is likely to be immediate and potentially substantial in the case of Cambodia, where provision of and access to health care is low and insufficient to answer the rural population's needs. Where malnutrition incidence is high, especially among Cambodian rural households, the impact of calorie intake and health measures are likely to be even higher, as was found by Behrman, Foster, and Rosenzweig (1997) for Pakistan. These findings are also reinforced for less educated (Thomas and Strauss 1997 in Brazil), poorer households (Behrman, Foster, and Rosenzweig 1997) and for farmers with a lower body mass index (Haddad and Bouis 1992), which make them even more relevant to our targeted Cambodian households. For Cambodian landless households (Group C) who depend heavily on wage income, this productivity increase is likely to have especially important implications on livelihood.

In this simulation, we assume a modest impact of better access to health services on the corresponding labor productivity. Our formalization is as follows:

$$Q_a = A_a \cdot [\alpha_a \cdot (ADF_{L,a} \cdot L_a)^{-\rho_a} + (1 - \alpha_a) \cdot (K_a)^{-\rho_a}]^{-\frac{1}{\rho_a}}, \quad (3)$$

where  $Q_a$  denotes the quantity produced by the agricultural sector  $a$ ,  $L_a$  the demand for labor,  $K_a$  the demand for capital,  $A_a$  the efficiency parameter,  $\rho_a$  the production function exponent and  $\alpha_a$  the elasticity of substitution between labor and capital.  $ADF_{L,a}$  is a factor-specific technical change that allows increasing the productivity of labor in this sector; it is set to 1 in the base year.

This CGE model uses production functions with constant elasticity of substitution (CES); therefore the increase in labor productivity resulting from improved access to health services is reflected through the parameter  $ADF_{L,a}$ . The present simulation assumes that the elasticity of labor efficiency with respect to health spending,  $e_L$ , is 0.2:

$$\frac{dADF_{L,a}/ADF_{L,a}}{dH/H} = e_L. \quad (4)$$

For  $\alpha = 50$ , the increase in health spending ( $H$ ) for beneficiary households represents a 50 percent increase from that of the base year. Therefore,

$$\frac{dH}{H} = 0.5 \Rightarrow \frac{dADF_{L,a}}{ADF_{L,a}} = 0.1. \quad (5)$$

The productivity impact is captured in the production function through a change in the factor-specific technical change; therefore  $dADF_{L,a} = 0.1$  and  $ADF_{L,a} = 1.1$  in the present scenario.

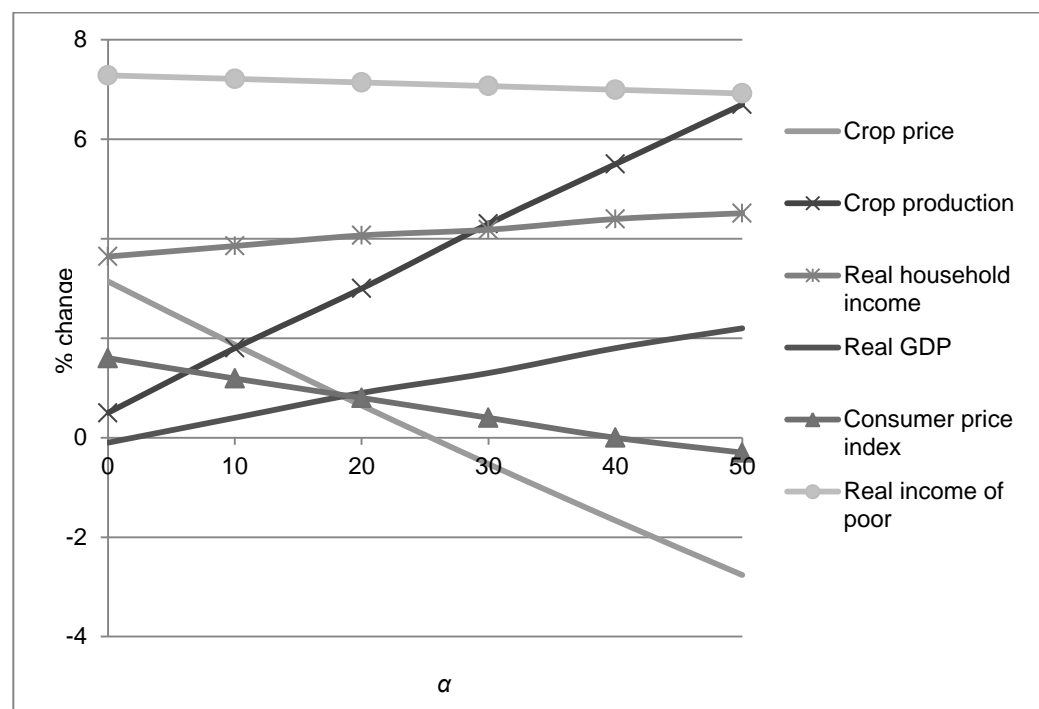
Given the parameters in the production function, this change corresponds to a 3 percent increase in labor productivity ( $\frac{dQVA}{dL}$ ). This elasticity and the corresponding productivity increase are therefore set below those of most empirical results from the literature cited above.<sup>8</sup>

The model generates a range of simulations that represent gradually higher shares of the health and education component in the total amount of public spending. So it looks at a range of policies that combine cash transfers with health and education interventions in proportions ranging from 0 to 25 percent of total public spending. The scenario based on  $\alpha = 0$  corresponds to a simple UCT policy with 100 percent of the public spending allocated to transfers to households (identical to the previous scenario). The one with  $\alpha = 50$  corresponds to a program wherein 50 percent of the budget is dedicated to health and education policies.

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<sup>8</sup> See McNamara, Ulimwengu, and Leonard (2010) for a review of the value of these elasticities estimated in the empirical literature.

**Figure 4.2 Changes in main economic indicators according to the value of  $\alpha$  (the share of public spending dedicated to health and education services)**



Source: Model simulation results.

Note: GDP = gross domestic product. The abscissa axis represents the value of  $\alpha$ , the ordinate the percent changes in the indicators.

The results of this simulation are shown in Table A.1 in the appendix and are summarized in Figure 4.2 for a selection of economic indicators. These results are relatively different from those for UCT because the distribution of safety nets to households does not in this case generate price effects on domestic markets. The health and education component of the measure and its impact on labor productivity allow mitigating the distortions on domestic markets and allow an effective response from the local food-crop production to the increase in demand. As Figure 4.2 shows, the larger the share of the budget allocated to health and education measures, the better the mitigation of the negative impact on prices, markets, and trade from cash transfers, while both beneficiary and nonbeneficiary households benefit from the poverty reduction impact. Why is this so?

In this scenario, improving agricultural labor productivity through better access to health services has two direct economic effects: first, agricultural production is increased and second, rural incomes rise (wage or labor income reflects this increase in factor productivity). The impact on agricultural production is directly induced by the increase in labor productivity, which implies that larger quantities (+6.7 percent) can be produced with the same amount of factors, that is, labor and capital. As a result, the consumer price index does not change and the price of agricultural food is reduced by almost 3 percent when the public spending is equally shared between cash transfers and social development policies (that is, for  $\alpha = 50$  percent). In this simulation, CCT supports producing more agricultural goods and livestock, and selling them at a lower price. This appears to be 50 percent more beneficial to Cambodian household income on average than when cash transfers are implemented alone (Table A.1).

The simultaneous impact on supply and demand (generated by the cash transfer component) is beneficial for trade, investment, and real GDP, all indicators that improve significantly with the share of public spending dedicated to the health and education component of the policy. While real GDP was unchanged with UCT, its level is now 2 percent higher than in the base year (Table 4.3).

**Table 4.3 Aggregate results from simulation of conditional cash transfers to Groups A, B, and C for  $\alpha = 50$  percent (in percent changes from base values)**

Total household income		Income of the poor		Real GDP	Crop production (volume)	Consumer price of agricultural products	Consumer price index
Nominal	Real	Nominal	Real				
4.5%	6.9%	4.5%	6.9%	2.2%	6.7%	-2.8%	0%

Source: Model simulation results.

Note: GDP = gross domestic product.  $\alpha$  = the share of public spending dedicated to health and education services.

The health and education components of CCTs appear to generate more poverty reduction than the transfer itself. Beyond the importance of households' health and education in themselves, this confirms the significance of CCTs as an investment for present and future income (Haddad and Bouis 1992) because the incremental income flow is likely to be increased over a number of years. To conclude, these simulation results show that the larger the share of the health and education component in the CCT policy, the less likely price increases are to appear on domestic markets. Hawkes and Ruel (2006) explained that the lack of coordination between health and agricultural policies might undermine the impact of both measures. These results similarly show that designing social transfers and human capital development policies jointly is likely to improve the impact of both measures.

### Preventing Price Effects and Stimulating the Local Economy

The results from these two sets of cash transfer simulations (UCT and CCT) show that distortions are likely to be generated on domestic prices and on trade as the result of the surge in demand if the total amount transferred to households corresponds to even a small percentage of GDP (2 percent in this study). If the measures are repeated and sustained over time, these effects are most likely to affect the country growth pattern. The existing literature on Dutch disease and on aid shows that in order to counterbalance negative price effects, productivity-enhancing measures have to be implemented simultaneously to the shock (see Barder 2006; Levy 2007). Improving the country's ability to respond to a surge in demand by tackling production bottlenecks and sectors lacking productivity are the most effective ways to protect the domestic economy. Because the Dutch disease effect appears to be predominantly transmitted through the agricultural sector, it seems particularly relevant to support this sector more specifically.

In the case of Cambodia, an extensive literature and a large body of evidence is emerging from research carried out over the past decade showing that the productivity of the agricultural sector is lagging behind that of neighboring countries and that there are several major obstacles to its development, such as lack of access to irrigation and fertilizers; lack of transport infrastructure, which hinders the functioning of markets and isolates regions; and lack of access to finance (World Bank 2005, 2009)—all of which make producers dependent on costly middlemen at all stages of the production process and inhibit capital accumulation (World Bank 2009). Among others, Engvall, Sjöberg, and Sjöholm (2008) and World Bank reports on rural development in Cambodia (2005, 2009) explain that the improvement of agricultural productivity is a requisite not just for poverty reduction in rural Cambodia but also for the country to maintain high levels of economic growth.

The following section looks at the impact of such agricultural growth policies when implemented simultaneously with cash transfers. To do so, the simulation combines cash transfers with public investment in the food-crop sector, using the same total amount of public funds as in the previous scenario. This investment allows for an increase in the sector's TFP, namely irrigation and water management infrastructure, as well as access to yield-improving inputs such as fertilizers.

The formalization is as follows:

$$Q_a = TFPR \cdot A_a \cdot [\alpha_a \cdot (ADF_{L,a} \cdot L_a)^{-\rho_a} + (1 - \alpha_a) \cdot (K_a)^{-\rho_a}]^{-\frac{1}{\rho_a}}, \quad (6)$$

where  $Q_a$  denotes the quantity produced by the agricultural sector  $a$ ,  $L_a$  the demand for labor,  $K_a$  the capital stock,  $TFPR \cdot A_a$  the efficiency parameter, and  $\alpha_a$  the elasticity of substitution between labor and capital in sector  $a$ .

The model assumes

$$TFPR = \lambda \cdot (IG \cdot GINV)^\mu, \quad (7)$$

where  $IG$  is the initial level of public investment and  $GINV$  the growth rate of  $IG$ . The value of  $\lambda$  is set so that  $TFPR = 1$  before the shock (that is, before any new public investment). With public investment,  $TFPR$  increases from 1 to  $(GINV)^\mu$ , the level of total factor productivity being  $TFPR \cdot A_a$ .

The impact of public investment in the agricultural sector on the productivity of physical and human capital and on total factor productivity ( $TFPR$ ) has long been of interest to economists and the focus of a large amount of empirical research. The impact of public investment on domestic output was initially measured empirically through its returns on TFP at the macroeconomic level (Aschauer 1989)<sup>9</sup> and later refined to investment in a specific sector, such as education (Aghion et al. 2009) or roads (Fan, Hazell, and Thorat 1999; Binswanger, Khandker, and Rosenzweig 1993). It has been applied more specifically to developing economies and their agricultural sectors by Binswanger, Khandker, and Rosenzweig (1993) and Rosegrant and Evenson (1995) for India; Diao and others (2010) for Nigeria; Mendes, Teixeira, and Salvato (2009) for Brazil; Fernandez-Cornejo and Shumway (1997) for Mexican agriculture; and Fan and Zhang (2004) for rural infrastructure in China. These studies offer empirical estimates of public investment return, which corresponds to  $\mu$  in our model.

Two empirical studies give a precise and even more relevant estimate of this return for Cambodia over the same period. Based on the same data used in the present model, Fan and Yu (2011) empirically estimated the return on public investment in irrigation and fertilizers (among other public goods) on the production of wet-season and dry-season paddies. The authors found that a 1 percent increase in the use of fertilizer leads to an output rise of 0.2 to 0.26 percent depending on the region, while irrigation generates a 0.15 to 0.21 percent increase. Arulpagasam and others (2003) similarly found that the Green Revolution package (which includes irrigation and fertilizer interventions) increased rice production by 4 percent.

These empirical studies provide estimates of how and by how much public investment in rural infrastructure and public goods such as roads, irrigation, and yield-enhancing inputs such as fertilizers impact the production function of agricultural products, allowing a rigorous embodiment of investment returns in the present model and simulations. Embodying the impact of public investment in the total factor productivity of the agricultural sector allows the CGE model to make the link between the amount of public investment and the impact on food-crop production, a link that otherwise would be difficult to implement.

In the present simulation, the value of  $\mu$  is set to 0.04. Given the initial level of public investment in this sector and the amount of public investment simulated in the scenario, that parameter corresponds to a return of 0.2 when public spending is entirely dedicated to agricultural interventions, much less for a combination of CCT with a higher share of transfer.

This value falls in the range of empirical returns estimated for Cambodian agriculture (Fan and Yu 2011, Arulpagasam et al. 2003) but falls below estimates in the previously cited literature—such as Fan and Zhang (2004), who estimated  $\mu = 0.26$  for irrigation and 0.15 for fertilizers in the case of China; or Mendes, Teixeira, and Salvato (2009), who estimated  $\mu = 0.2$  for irrigation in Brazil.

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<sup>9</sup> See Anderson, De Renzio and Levy 2006 for a literature review



The assumed elasticity can be considered as conservative with regard to the literature cited above. Given the initial conditions in the Cambodian agricultural sector, which has particularly low yields and low capital intensity (World Bank 2005, Fan and Yu 2011) compared with those of neighboring countries such as Vietnam or Thailand, for example, one might expect a larger productivity response.

The analysis first considers the case in which public funding  $F$  is equally shared between social protection and agricultural growth policies. In such a case, the productivity improvement in the agricultural sector leads to a substantial increase in domestic food production (+12.5 percent) as well as a decrease in its price (-9.5 percent). In comparison, when cash transfers are implemented alone, the prices of agricultural products rise by 3 percent. The Cambodian food processing industry, which uses agricultural products as intermediate inputs, benefits from this direct effect on production and prices, and increases its output by almost 7 percent, while its price diminishes by 2 percent.

The quantity of agricultural imports increases by only 2 percent and agricultural exports increase by 20 percent, as opposed to decreasing by 1.5 percent when cash transfers are implemented alone. Similarly, the export of other manufactured food rises by 9 percent, in contrast with its decrease with UCT alone. With regard to external trade, the negative impact of cash transfers on the current balance is reversed.

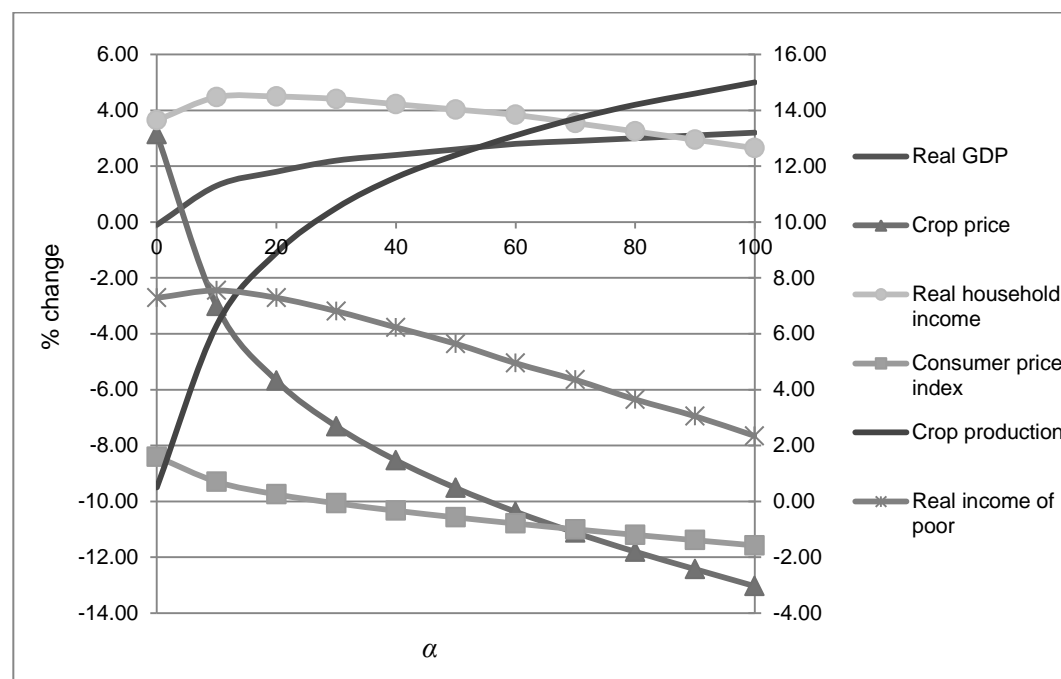
These combined effects on markets and trade result in increased GDP. With regard to growth, once again, the productivity-enhancing component of the present policy is sufficient not only to prevent any price effects from CT but also to generate a higher level of real GDP (+2.6 percent).

Remarkably, when the income and purchasing power of households improve, their consumption of health and education services rises by 3 percent, even with no conditionality imposed on them. This result is especially noteworthy because the consumption of these services increased only marginally when there was no conditionality attached to the distribution of cash transfers.

How does the share of total public funding dedicated to agricultural policies affect these results? Figure 4.3 illustrates the percent change resulting from different combinations of cash transfers to the poorest category of Cambodian households and agricultural growth interventions. As with CCTs, the model tests the impact of a range of combinations of these two measures. On this graph,  $\alpha$  is the share of total public funding,  $F$ , dedicated to cash transfers. Therefore  $(1 - \alpha)$  is the share of  $F$  allocated to agricultural growth. When all the public funding,  $F$ , is used for cash transfers only, then  $\alpha = 0$  and in this case, the simulation corresponds exactly to the one presented above, under “Unconditional Cash Transfers” Section.

Figure 4.3 shows the economic impact of a progressively larger share of public funding dedicated to agricultural interventions. When the curve linking the points corresponding to  $\alpha = 0$  and  $\alpha = 100$  is straight, forming a line between the two axes, the results show that there is no complementarity between the two interventions that are modeled. If, on the other hand, the curve goes above the straight line, it indicates that some combination of the two interventions would generate higher results than either implemented alone. Complementarity is found here with respect to any indicator in the model, whether it relates to poverty reduction or to economic indicators.

**Figure 4.3 Percent change in main economic indicators according to the value of  $\alpha$  (the share of public spending dedicated to productive investment in agriculture)**



Source: Model simulation results.

Notes: GDP = gross domestic product. The abscissa axis represents the value of  $\alpha$ , the ordinate the percent changes in the indicators. Changes in crop production, real income of the poor, and consumer price index should be read on the right-hand side axis.

The bigger the share of public spending dedicated to the support of agriculture, the larger the positive impact on trade, investment, and GDP. In terms of poverty reduction, the simulation results reveal a certain degree of complementarity between cash transfers and agricultural growth policies, because the income of the poor (that is, households in Groups A, B, and C) is maximized when public funds are shared between these two policies with a 70/30 ratio. This means that results are better in terms of poverty reduction when these two sets of measures are implemented simultaneously rather than when any of them is implemented alone (Table 4.4).

**Table 4.4 Aggregate results from simulation combining cash transfers and public investment in the agricultural sector in equal shares (in percent changes from base values)**

Total household income		Income of the poor		Real GDP	Crop production (volume)	Consumer price of agricultural products	Consumer price index
Nominal	Real	Nominal	Real				
4%	4.1%	5.6%	5.7%	2.6%	12.4%	-9.5%	0%

Source: Model simulation results.

Note: GDP = gross domestic product.

This result is in line with those of Fan and Yu, who found that “increasing farm productivity may be the single most important pathway out of poverty in Cambodia as the potential of land expansion is limited” (2011, 448).

This result again echoes some of the recent literature on Dutch disease. This literature demonstrates that in order to respond to a surge in domestic demand and avoid the occurrence of adverse price effects, the windfall or the foreign aid needs to be used to finance investments that improve the productivity of the domestic sectors. When the domestic supply response is reinforced, economic distortions and sector decline are less likely to happen in an open economy that experiences a resource boom or that receives aid. Under such conditions, what is called the *resource curse* is actually more likely to become a blessing in terms of both prospects for growth and poverty reduction (Adam and Bevan 2003; Barder 2006; Gelb 1988; Levy 2007). Similarly, results of the present study suggest that social protection should ideally be complemented by agricultural growth policies which would improve the productivity of this sector of the Cambodian economy, in order to promote growth and benefit a larger part of the Cambodian population in a more sustained way.

## 5. DISCUSSION

On the economic impact of social protection, results indicate that cash transfers are likely to generate investment in productive assets by households who receive them, which will make the program more effective in reducing these households' vulnerability in the longer run. This seems to be the case even when directed to the households that appear in the SES as the poorest on average (the rural working poor).

Simulations also show that UCTs alone could fail to generate a decrease in poverty beyond the transfers themselves. Cash transfers can generate excessive increases in domestic market prices and degradation of the external trade balance, without inducing a response in domestic production. In the case of a country like Cambodia, the economy appears not to be in a position to respond to a rapid increase in demand for consumption goods and services by beneficiaries via an increase in production. Instead, domestic production would be redirected from exports to domestic markets and imports would increase significantly.

On CCTs, the simulations are based on the hypothesis that the health component of these measures has a positive impact on human capital, and improves the labor productivity of the beneficiaries. Even if this impact is assumed to be very modest compared with existing empirical estimates, the results indicate a substantial benefit on rural labor markets and on wages. The study especially finds that this productivity impact can significantly increase supply and hence mitigate the risk of price increases on domestic markets and increased trade associated with cash transfers, effectively stimulating the economy.

It should be noted though that this modelling result does take into account the capacity of public institutions to deliver and guaranty the quality of public health services. Those are major determinants of the transfer's efficiency and could be affected by the scaling up of policies. Although this dimension cannot be included in the present modelling exercise, it should be noted that the capacity of public institutions to deliver these services and guaranty their quality would be determinant in the policy impact identified in the simulations.

Regarding the impact of both UCTs and CCTs, the model provide a conservative estimate of the effects on prices. The national model does not capture well the impact of a lack of transport infrastructure that hinders the functioning of trade and isolates rural markets. External trade is also assumed to be efficient enough to offset sluggish domestic supply when needed, and imports are assumed to be relatively good substitutes for domestic products. These hypotheses imply that the model underestimates the degree of isolation of markets in some regions. If trade is not efficient enough to supply markets at the local level, then a surge in demand might generate larger price effects on local markets than the results indicate. The role of trade is therefore major where cash transfers are to be implemented, because it allows mitigating the risks of price increase.

When cash transfers are combined with productive public investment, they are less likely to generate price increases on domestic markets. The economic impact of such programs are positive and substantial, because food-crop production and exports both increase substantially while imports are largely reduced. Household income, especially farm income, is also likely to increase significantly thanks to the productivity impact. These positive economic effects are also more likely to be sustained as a result of the accumulation of productive assets. Poverty reduction among all households is higher than when cash transfers are implemented alone. This indicates a strong complementarity between social protection and agricultural growth policies. Such policies should be designed in coordination rather than in parallel; safety nets are likely to have better poverty impact when integrated into larger investment and rural development programs.

Sadoulet, de Janvry, and Davis (2001), who conducted a study on beneficiaries of the PROCAMPO program in rural Mexico, estimated an income multiplier for investment made from transfers received by small farmers, whose liquidity and credit were constrained. The multiplier was found to be significant and substantial for the richest recipients, who were able to divert part of the transfers from household consumption. However, the authors explained that the surge in consumption could create large price increases on isolated markets so that even a good multiplier operating on a small (possibly marginal) part of the productive sectors might fail to offset the price increases. They concluded their study by arguing that transfers might under some circumstances be better used for the modernization of agriculture and that a strong complementarity prevails with rural investment in infrastructure and in favor of technological change, which is also among the results of this study. On these two points, the present results are equivalent to theirs.

## 6. CONCLUSION

One can conclude that the ability of some key sectors, such as the food-crop sector, to respond to an increase in demand needs to be taken into account in the design of social protection measures. This analysis shows that in order for the Cambodian economy to satisfy the increase in demand generated by cash transfers, and therefore for the economy to benefit fully from such an opportunity, the Cambodian productive sectors need to be reinforced to become more responsive. Investments and gains in productivity are needed particularly in sectors in which the poor are employed. Results indicate that agricultural growth is needed to complement social protection in order to avoid excessive price increases and for the domestic economy to benefit from the surge in demand. The direct and indirect benefits from social protection programs can be realized only if they are coupled with macroeconomic policies that facilitate productivity gains and allow for multiplier effects to appear.

While the methodology in this paper captures direct and indirect effects operating through markets, it is important to note its limits. First, this model is, by definition, a simplified and imperfect version of a much more complex economic reality. Another limitation of this modeling exercise is that it is static and offers only a short-term perspective on policy impacts. These programs, when extended over time, will lead to economic agents' adapting their behavior, investing, and earning dynamic returns. Repeated transfers could also lead to improvements in domestic supply, which would address and correct the adverse price effects arising from isolated markets. A long-term perspective would be necessary to analyze these issues. Finally, the Cambodia case is interesting, but other country studies are needed to generate enough information to draw comparative conclusions. This research needs to be replicated for a diversity of countries to understand how robust, relevant, and transferable its results are.

## APPENDIX: SUPPLEMENTARY TABLE

**Table A.1 Results from simulations on UCT, CCT, and mixed UCT/investment programs**

Variable	Base	UCT	CCT	Equal mix UCT and productive investment	Productive investment in agricultural sector
	Billion riels	% change			
<b>Total Cambodian household income (nominal)</b>	<b>19,062</b>	<b>3.7</b>	<b>4.5</b>	<b>4</b>	<b>2.6</b>
Group A income	983	6	6	5	2.2
Group B income	128	32	25	17.5	2
Group C income	6,977	7.2	6.7	5.4	2.3
Income poor (nominal)	8,088	<b>7.4</b>	<b>6.9</b>	<b>5.6</b>	<b>2.3</b>
<b>Real total household income</b>	<b>19,062</b>	<b>3.6</b>	<b>4.5</b>	<b>4.1</b>	<b>2.7</b>
<b>Real income of the poor</b>	<b>8,088</b>	<b>7.2</b>	<b>6.9</b>	<b>5.7</b>	<b>2.3</b>
<b>Production</b>	<b>37,733</b>				
Crops	4,211	0.5	6.7	12.4	15
Livestock, poultry and fishery	3,906	0.8	6.4	2.8	2.9
Forestry and logging and mining	720	-0.9	2.2	-0.2	0.3
Food, beverages and tobacco	2,019	0.2	3.9	6.6	8
Textile, wearing apparel and footwear	8,690	0.1	-1.6	-1.9	-2.4
Other manufacturing	1,454	-2.7	-0.5	0.1	1.6
Electricity, gas and water	772	0.7	1	0.9	0.8
Construction	2,347	-10.7	-2.9	-0.4	4.9
Trade	3,672	0.3	0.7	0.7	0.6
Hotel and restaurants	2,230	0.1	0.6	0.8	0.9
Transport and communications	2,161	0.4	-0.3	-0.5	-0.7
Finance	323	-0.1	0.3	0.4	0.5
Public administration	966				
Real estate and business	1,729	0.2	0.7	0.7	0.7
Other services	1,916	2.3	2.3	2.3	1
Education	241	1.4	3.3	3.3	3
Health	376	1.8	3.2	3.2	2.6
<b>Agricultural exports (in quantity)</b>					
Crops	495	-1.6	9	20	26
Livestock, poultry and fishery	383	-1.2	8.5	1.5	2.0
<b>Agricultural imports (in quantity)</b>					
Crops	922	3.5	3.9	2	0
Livestock, poultry and fishery	66	3.6	3.6	5	4
<b>Price of agricultural goods</b>	<b>1</b>	<b>3.1</b>	<b>-2.7</b>	<b>-9.5</b>	<b>-13</b>
<b>Consumer price index</b>	<b>1</b>	<b>1.7</b>	<b>0.1</b>	<b>-0.5</b>	<b>-1.5</b>
<b>Nominal GDP</b>	<b>21,116</b>	<b>0.1</b>	<b>1.9</b>	<b>2.3</b>	<b>2.7</b>
<b>Real GDP at market price</b>	<b>21,116</b>	<b>-0.1</b>	<b>2.2</b>	<b>2.6</b>	<b>3.2</b>

Source: Model simulation results.

Notes: CCT = conditional cash transfers; GDP = gross domestic product; UCT = unconditional cash transfers.

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