Cash Transfers in Developing Countries: Local Multipliers, Aggregate Effects, and External Adjustment*

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Abstract

What are the macroeconomic impacts of cash transfers in developing countries, and how do they change as programs scale up? To answer these questions, we build a two-region New Keynesian small open economy model and calibrate it to rich microdata from a randomized controlled trial (RCT) in Malawi. The model implies a local multiplier on temporary transfers of about one in treated regions, which depends on the degree of price stickiness, the share of liquidity-constrained households, and the extent of local bias in consumption. Spillovers to the rest of the country can be negative if the capital account is closed, as the transfer can appreciate real exchange rate and crowd out exports, but can be positive when capital can flow more freely and even larger when the exchange rate is fixed. A counterfactual scaled-up cash transfer program is likely to have smaller local and aggregate multipliers in Malawi, mostly due to its closed capital account. Our analyses suggest that macroeconomic frictions and the monetary policy regime are crucial to pin down the aggregate effects of scaled-up programs from local RCT estimates.

Keywords: cash transfers, randomized control trials, local multiplier, developing countries, capital account openness, exchange rate regime

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1. Introduction

Cash transfers are a key policy tool to reduce poverty and provide countercyclical stimulus, and have been increasing in scale and popularity. For example, GiveDirectly, an international non-governmental organization, has provided large temporary cash transfers—typically close to 100% of per capita GDP—to more than 1.5 million poor people in treatment regions of developing countries. But they have the ambition to expand to provide cash transfers to *every* poor person in low-income countries like Malawi and Rwanda. The increasing scale of cash transfer programs has raised questions about their macroeconomic effects, both on sub-national regions receiving them and broader spillovers to the national economy via general equilibrium mechanisms.

Although there is a large empirical literature on the micro effects of cash transfers through randomized controlled trials (RCTs) at an individual level, much less is known about their macro impacts. One exception is the recent RCT of Egger et al. (2022), who estimate a large positive impact of GiveDirectly cash transfers on local GDP in Kenya. But even then, there is less understanding of the relevant mechanisms, especially in a quantitative sense. This raises questions about how the multiplier might change across locations with different features of the economic environment such as openness or price-setting behavior. Moreover, RCTs cannot measure the effects of cash transfers on the national economy, or the direction of general equilibrium spillovers as the program scales, a question crucial to policymakers.

In theory, the macroeconomic effects of cash transfers are ambiguous depending on model features and parameters. From a Keynesian perspective, we might expect the cash transfer to be spent on locally produced goods, leading to a positive impact on local GDP with little inflation. But from a more neoclassical perspective, transfers may be saved, spent on imports or lead to high prices, resulting in little impact on local output. Moreover, as externally-funded transfers scale up, general equilibrium effects through mechanisms such as exchange rate adjustment are likely to become more important.

This paper investigates the short-run macroeconomic effects of temporary cash transfers in developing countries and how the effects change as cash transfer programs scale up. We focus on the impact multiplier, defined as the dollar change in GDP per dollar of transfer in the first year, as our summary statistic. To that end, we first build a general equilibrium model and analyze how cash transfers to residents of a treated region can boost local GDP and inflation. Second, we study the size and direction of spillovers from the treated region to the rest of the economy, and how general equilibrium effects coming from the macroeconomic environment such as the exchange rate

regime or capital account openness shape these spillovers.

More specifically, our model is a two-region New Keynesian small open economy (NKSOE) model augmented with a rest-of-the-world (ROW) block that pays a cash transfer to residents of the treatment region. Besides nominal rigidities, our model incorporates key features of developing economies at the household and macro levels. At the household level, the model includes two types of households, one of which is liquidity-constrained and consumes all of its income each period in a hand-to-mouth fashion. This household type also suffers from financial stress which reduces effective labor supply in normal times, but financial stress can be potentially alleviated by cash transfers (see Kaur et al. (2025), Sergeyev et al. (2024) and Duquennois and Jagnani (2026)). At the macro level, our model includes exchange rate controls and debt-elastic country premium interest rates which limit international capital flows (Schmitt-Grohé and Uribe (2003) and García-Cicco et al. (2010)). These features are key in determining the effect of scaled-up transfers.

To calibrate the model, we exploit rich microdata from an ongoing RCT in Malawi. The microdata are surveys of households and enterprises that allow us to measure the degree of home bias in consumption, the share of hand-to-mouth households, the degree of financial stress as well as information on price rigidity. We then consider a temporary transfer, capturing the ongoing RCT in Malawi, of a large one-time cash transfer from GiveDirectly to households in the Chiradzulu district of Malawi.

We find that the local output multiplier in the baseline is about 1, i.e. if a treatment region receives \$1 more in cash transfers than control regions, its output goes up by about \$1 in the first year.[1] This local multiplier is smaller than the 2.5 estimated by Egger et al. (2022) in Kenya. Our analyses suggest that the local multiplier depends crucially on the degree of price stickiness, the strength of local bias in consumption, and the fraction of hand-to-mouth households in the local economy. These parameters determine the strength of the demand channel in the local economy. At the same time, open economy features such as the exchange rate or capital account regime do not affect the size of the local multiplier when the treatment region is small, like a village or a district in Malawi with a size of about 0.5% of the country. Financial stress is quantitatively less important than the demand channel when the per capita transfer is large.

Furthermore, we show that cash transfers in a region of the small open economy can have spillover effects on the rest of the economy, the size and direction of which depend crucially on the

[1] When the RCT is complete, we can compare the estimate in our model to those measured in the RCT.

macroeconomic policy environment. Intuitively, when a treatment region receives cash transfers, there are two opposing forces on the rest of Malawi (the control region). First, transfers raise demand for the control region's tradable goods, creating a positive spillover. Second, the foreign currency inflow can also appreciate the real exchange rate and reduce net exports, creating a negative spillover. In equilibrium, whether the spillover is positive or negative depends on the exchange rate regime and capital controls. Under our baseline calibration with a closed capital account—no international borrowing and lending—spillovers from the treatment region to the rest of the economy are negative. Consequently, the aggregate multiplier, defined as the total change in Malawi's national output when there is a $1 cash transfer, is smaller than the local multiplier. On the other hand, when the economy can borrow and save from international financial markets, spillovers are positive and the aggregate multiplier is larger than the local multiplier. The aggregate multiplier can be even larger in a fixed exchange rate regime with an open capital account.

We then use our model to simulate the macroeconomic impacts of a counterfactual scaling-up of the cash transfer program. As Malawi has severe capital flow restrictions, the aggregate multiplier is around 0.63, which is much smaller than the local multiplier of about 1.09. As the program scales up, the size of the treatment region expands, the macroeconomic policy environment becomes more important for the impacts on local GDP in the treatment region, and the local multiplier converges towards the aggregate multiplier. However, assuming that poorer regions are prioritized for transfers also means that scaling up reduces the share of liquidity-constrained households in the treatment region, making transfers less targeted overall, which in turn reduces the aggregate multiplier. Combining the effects suggests a substantial fall in both the local and aggregate multipliers in Malawi. For example, if the program were scaled up to treat 15% of the population, the local multiplier would fall to 0.86 and the aggregate multiplier to 0.31. Our counterfactual demonstrates that local multipliers measured in an RCT may overstate the short-run local effect of a scaled-up temporary cash transfer program in an economy where capital flows are restricted. We note that the effect of scaling up cash transfers depends on the macroeconomic policy regime of the country. Other countries, like Kenya, which receive GiveDirectly transfers but are more open to capital flows can have much more positive impacts.

We further enrich our model to capture Malawi's large parallel exchange rate premium, currently around 150% above the official rate. We model this as a tax on currency inflows by requiring exporters and GiveDirectly to exchange USD for Kwacha at the less favorable official exchange rate. We find that the parallel exchange rate in Malawi does not affect local multipliers measured

at the official rate substantially, though the parallel rate can increase the aggregate multiplier if revenue from the implicit tax on the transfer is used to reduce the parallel premium, which boosts exports. However, the existence of the parallel rate can also change how multipliers should be measured. Specifically, if the resource cost of the transfer is measured at the parallel rate rather than the official rate, then all multipliers fall by almost two-thirds.

Finally, scaled-up cash transfers also have sizable effects on national GDP growth, mostly because the transfers themselves are very large. For example, in Malawi, our model suggests that a larger cash transfer program worth 10% of GDP could boost national GDP growth by 3–5 percentage points.

Related literature. Our paper contributes to a small but growing literature on the macroeconomic impacts of cash transfers in developing countries. For example, Egger et al. (2022), Gerard et al. (2021) and Mendes et al. (2026) empirically estimate the short-run effects of cash transfers on the local economy, i.e. the local multiplier, in developing countries.[2] Unlike these empirical papers, we build a general equilibrium model to study the effects of cash transfers in developing countries. Walker et al. (2024) and Kim and VanVuren (2026) also model a local cash transfer multiplier, though using an alternative slack-based mechanism. Relative to these papers, we focus on the interaction between the local and aggregate multipliers, which allows us to simulate the impact of the international macro-policy environment as cash transfer programs scale. To our knowledge, our paper is the first to document the importance of open economy aspects—restricted international capital flows, fixed and parallel exchange rate regimes—for aggregate and scaling-up cash transfer multipliers in developing countries.[3]

We also contribute to a small literature studying the aggregate effects of foreign aid in developing countries using structural models. For example, Berg et al. (2010) and Berg et al. (2015) study how foreign aid to the government affects the aggregate economy in a New Keynesian model adapted to low-income countries. Bangara (2019) uses a New Keynesian model to study the implications of foreign exchange constraints on the aggregate economy in Malawi. Unlike these papers, our

[2]There is a larger literature that uses cross-sectional variation across US states and municipalities to estimate the local effects of government spending and transfers, including Chodorow-Reich et al. (2012); Nakamura and Steinsson (2014); Pennings (2021). Our paper also relates to theoretical papers on the determinants of the fiscal multiplier like Murphy (2017)

[3]Our paper also relates to a large empirical literature estimating the macroeconomic impact of fiscal policies: in the aggregate time series for advanced countries (Ramey (2019), Auerbach and Gorodnichenko (2016); Ramey and Zubairy (2018); Miyamoto et al. (2018)), and for developing countries (Kraay (2014), Sheremirov and Spirovska (2022) and Bracco et al. (2021) among others).

paper studies direct cash transfers which do not flow through the government budget, and is able to connect the local and aggregate effects of aid flows.

Finally, our paper contributes to a policy debate on whether foreign exchange inflows and fiscal expansions in developing countries appreciate the exchange rate and harm competitiveness. Our mechanism is in line with the findings of Miyamoto et al. (2019), who document that government spending shocks tend to appreciate the real exchange rate in developing countries. However, we note that the empirical literature on the responses of the real exchange rate to fiscal policies is not settled. For example, Jarotschkin and Kraay (2016) find no evidence of a short-run appreciation due to foreign aid disbursements.

The paper proceeds as follows. We first describe the context of the GiveDirectly RCT in Malawi in Section 2. In Section 3, we present the model in detail. Section 4 discusses the calibration of our model to the data in Malawi. Section 5 characterizes the determinants of the local multiplier along with a quantitative prediction in our full model. We present the analyses for the aggregate multiplier in Section 6. Section 7 shows how impacts vary as the cash transfer program scales up. Section 8 discusses extensions and robustness to alternative calibrations. Section 9 concludes.

2. Context on Malawi and GiveDirectly

Malawi is one of the poorest countries in the world: 75 percent of the population lives in extreme poverty, and gross national income per capita is only US$570. As in many extremely poor countries, agriculture dominates the economy. Nearly two-thirds of households work in agriculture, mostly in subsistence rain-fed farming. Malawi produces few consumer or capital goods, and raw tobacco, together with other agricultural products, accounts for the bulk of exports.

GiveDirectly is a non-governmental organization that seeks to reduce poverty via large lump-sum unconditional cash transfers directly to recipients. In Malawi, recipients receive around US$550 per adult via mobile money—a small US$50 test payment followed by a US$500 main transfer—which corresponds to approximately 100% of Malawi's GDP per capita. GiveDirectly also operates elsewhere, reaching over 1.6 million people in 15 countries.

GiveDirectly has two cash transfer programs in Malawi connected to this paper. The first is a smaller project in the Khongoni subdistrict, where the transfer was *universal*: every adult received the payment, and identification of short-run effects comes from randomization over the *timing* of disbursement rather than across recipients. The Khongoni study (Egger et al. (2025)) provides complementary evidence on household marginal propensities to consume and on the behavior of

local prices, which we draw on in our calibration (see Appendix Figures C4 and C5).

The second program is an ongoing RCT in the Chiradzulu district. Chiradzulu is one of Malawi's 28 districts, with a population of about 450,000 people spread across 10 Traditional Authorities (TAs). The transfer is untargeted and is disbursed to approximately 40% of the adults in the district. We exploit data from the pre-transfer baseline household and enterprise surveys to calibrate the model.

Although the transfer is small relative to the national economy, around 0.5% of Malawi's GDP, it is large relative to the treated area. The aggregate inflow corresponds to roughly 30% of GDP in Chiradzulu as a whole and approximately 70% of GDP in the treated villages. This intensity is much larger than in most cash transfer RCTs. For comparison, Egger et al. (2022)'s Kenyan cash transfer RCT in Siaya County operated on a treated area of similar size to Chiradzulu, but transfers were more narrowly targeted, resulting in a transfer of 15% of village-level GDP in treated villages and only about 5% of county GDP.

3. The Model

Against the above background, we build a small open economy New Keynesian model as in Gali and Monacelli (2005) and incorporate several features of developing countries such as international financial frictions, as in García-Cicco et al. (2010) with capital account controls and potentially a managed exchange rate regime. More specifically, the model consists of a small open economy with two regions, which trade both goods and bonds with a rest-of-the-world (ROW) block. The two regions in the small open economy are in a monetary union: a treatment region of size n, representing a district in Malawi whose residents receive a GiveDirectly (GD) transfer, and the rest of the Malawian population, in a "control" region of size $1-n$, whose residents do not receive any GD transfers. A share of households ω are hand-to-mouth, i.e. they consume all their income each period. Hand-to-mouth households also face financial stress that affects their labor supply. The remaining fraction $1-\omega$ are Ricardian and can trade non-state-contingent one-period domestic and international bonds.

In addition, we incorporate nominal rigidities in the model by assuming that firms adjust prices frequently but mostly to index to past inflation. This formulation is driven by the following reasons. First, the evidence in the surveys suggests that firms do not respond to demand shocks by raising prices. More specifically, in the micro data from the enterprise survey in Chiradzulu, only 20% of the enterprises respond that they would change their prices if demand doubled (or halved). In the

Khongoni subdistrict in Malawi, recipients received a one-time transfer of about 100% of the GDP per capita but local prices track aggregate prices closely (see Appendix Figure C5, Egger et al. (2025)). This observation is consistent with the findings of Egger et al. (2022), who also find no evidence of inflation in the Kenyan villages that receive cash transfers. Second, while prices seem to be quite flexible in Malawi, the country experiences high, volatile, and persistent inflation at the aggregate level (see Appendix Figure C6). In 2024, consumer price inflation in Malawi was about 30%, suggesting that firms change prices regularly.[4] Annual inflation is also highly persistent, with an autocorrelation of around 0.8, which is twice as large as that of the United States. The micro data from the enterprise survey in Chiradzulu also suggest that prices change often: the average age of prices is 4.4 months, implying a quarterly probability of price change of 50%, consistent with the evidence from India in Herreño et al. (2025). Our assumptions about price setting with indexation to past inflation is similar to that in the DSGE model for Malawi developed by Bangara (2019).[5]

We describe each of the elements of the model in detail below.

3.1. Ricardian Households

Ricardian households, denoted by an R superscript, in the treatment region choose consumption, labor, and can borrow and save by choosing domestic and ROW bond holdings to solve the following utility maximization problem. Their lifetime expected utility is given by

$$E_0 \sum_{t=0}^{\infty} \beta^t U\left(C_t^R, L_t^R\right), \tag{1}$$

where C_t^R and L_t^R denote consumption and labor, respectively. Ricardian households can hold both domestic and ROW non-state-contingent bonds. Their period-by-period budget constraint is given by

$$P_t C_t^R + \frac{B_{t+1}}{R_t^*} + ex_t \frac{B_{w,t+1}}{R_t^{rw}} = B_t + ex_t B_{w,t} + W_t^L L_t^R + NT R_t^R + \Pi_t^R \tag{2}$$

where P_t is the treatment region's consumption price (CPI), B_t and $B_{w,t}$ are the domestic small-open economy and ROW non-state contingent bonds that mature in one period, respectively, R_t^* is the nominal interest rate in Malawi's home currency (Kwacha), R_t^{rw} is the nominal interest rate

[4] See Gagnon (2009) and Alvarez et al. (2019) for evidence from developing countries. Intuitively, with inflation so high, firms that did not regularly adjust prices would likely go out of business.

[5] Berg et al. (2015) and others also impose Calvo price stickiness in their models for low income countries such as Mozambique and Uganda.

in ROW currency, US dollars (USD), for domestic households, W_t denotes the nominal wage, ex_t is the nominal exchange rate (Kwacha per USD), NTR_t^R denotes nominal transfer to the Ricardian households, and Π_t^R denotes firms' nominal profits distributed to the Ricardian households. Consumption by Ricardian households is an aggregator of tradable, $C_t^{R,T}$, and non-tradable goods, $C_t^{R,S}$, as follows:

$$C_t^R = \left[\alpha_C^{\frac{1}{\theta_C}} \left(C_t^{R,T} \right)^{\frac{\theta_C - 1}{\theta_C}} + (1 - \alpha_C)^{\frac{1}{\theta_C}} \left(C_t^{R,S} \right)^{\frac{\theta_C - 1}{\theta_C}} \right]^{\frac{\theta_C}{\theta_C - 1}}, \tag{3}$$

where α_C is the share of tradable goods in final consumption and θ_C is the elasticity of substitution between tradable and non-tradable goods. Tradable consumption, in turn, is an aggregate of the consumption goods from the treatment region, denoted by the subscript h, the control region (f) and from the ROW (w), as follows:

$$C_t^{R,T} = \left[\left(\alpha_h^T \right)^{\frac{1}{\theta_T}} \left(C_{h,t}^{R,T} \right)^{\frac{\theta_T - 1}{\theta_T}} + \left(\alpha_f^T \right)^{\frac{1}{\theta_T}} \left(C_{f,t}^{R,T} \right)^{\frac{\theta_T - 1}{\theta_T}} + \left(\alpha_w^T \right)^{\frac{1}{\theta_T}} \left(C_{w,t}^{R,T} \right)^{\frac{\theta_T - 1}{\theta_T}} \right]^{\frac{\theta_T}{\theta_T - 1}}, \tag{4}$$

where θ_T is the elasticity of substitution between consumption goods of different origins, and α_h^T, α_f^T, $\alpha_w^T > 0$ are the parameters denoting the shares of each good in the consumption basket satisfying $\alpha_h^T + \alpha_f^T + \alpha_w^T = 1$. Non-tradable consumption is, by definition, only from the treatment region. Then, we can write the price of tradable goods in the treatment region as follows:

$$P_t^T = \left[\alpha_h^T \left(P_{h,t}^T \right)^{1-\theta_T} + \alpha_f^T \left(P_{f,t}^T \right)^{1-\theta_T} + \alpha_w^T \left(P_{w,t}^T \right)^{1-\theta_T} \right]^{\frac{1}{1-\theta_T}}. \tag{5}$$

Demand for tradable goods from the ROW in the treatment region by Ricardian households is then given by

$$C_{w,t}^{R,T} = \alpha_w^T \left(\frac{P_{w,t}^T}{P_t^T} \right)^{-\theta_T} C_t^{R,T},$$

where $P_{w,t}^T$ denotes the price of tradable goods from the ROW.[6] The problem for Ricardian households in the control region is analogous, and we add a star to the variables to denote their variables.

[6] We also assume that $P_{w,t}^{T,rw} = P_t^{T,rw}$, i.e. the price of ROW's tradable goods in USD is the same as the price of ROW tradable consumption.

3.2. Hand-to-Mouth Households

Hand-to-mouth (HtM) households choose consumption and labor to maximize their lifetime expected utility, given by

$$E_0 \sum_{t=0}^{\infty} \beta^t U\left(C_t^N, L_t^N + D\left(M_t^N\right)\right),$$

subject to the following period-by-period budget constraint:

$$P_t C_t^N = NTR_t^N + W_t^L L_t^N + \Pi_t^N, \tag{6}$$

where the superscript N denotes HtM households' variables, C_t^N and L_t^N denote their consumption and labor, respectively, and M_t is cash on hand. The financial stress term, $D\left(M_t^N\right)$, is defined below:

$$D\left(M_t^N\right) = \overline{D}^N exp\left(-\phi_D^N \frac{1}{C_{ss}^N}\left(M_t^N - M_{ss}^N\right)\right) - \overline{D}^N,$$

where the subscript ss denotes steady-state values, $\phi_D^N > 0$ is a parameter. The budget constraint in equation (6) implies that HtM households do not trade either domestic or ROW bonds and consume all of their income each period.

Following Sergeyev et al. (2024), we introduce financial stress into the model in the form of decreasing effective work time. Although part of the literature has focused on non-psychological costs of poor financial conditions, our focus is on the psychological dimension, $D(M_t^N)$, that represents productive time lost to financial stress, measured as working hours distracted by financial problems. In our formulation, we can interpret $\overline{D}^N exp\left(-\phi_D^N \frac{1}{C_{ss}^N}\left(M_t^N - M_{ss}^N\right)\right)$ as the financial stress that HtM faces and $-\overline{D}^N$ is a normalization that preserves a symmetric steady state even in the presence of steady-state stress. A higher value of M_t^N leads to less disutility from labor, leading to more labor supply, or higher productivity, and ϕ_D^N measures how much distracted hours decline.[7]

Similar to the Ricardian households, HtM households consume both tradable and nontradable goods, i.e.

$$C_t^N = \left[\alpha_C^{\frac{1}{\theta_C}}\left(C_t^{N,T}\right)^{\frac{\theta_C-1}{\theta_C}} + (1-\alpha_C)^{\frac{1}{\theta_C}}\left(C_t^{N,S}\right)^{\frac{\theta_C-1}{\theta_C}}\right]^{\frac{\theta_C}{\theta_C-1}}. \tag{7}$$

Tradable consumption good is a composite of tradable goods of different origins: treatment and

[7] We assume $P_t M_t^N = NTR_t^N + W_{ss}^L L_{ss}^N + \Pi_{ss}^N$, so that M_t^N responds to only transfers and not steady state cash on hand. In addition, HtM households are unsophisticated, meaning they do not optimize with respect to M_t^N.

control regions and ROW as follows:

$$C_t^{N,T} = \left[\left(\alpha_h^T\right)^{\frac{1}{\theta_T}} \left(C_{h,t}^{N,T}\right)^{\frac{\theta_T-1}{\theta_T}} + \left(\alpha_f^T\right)^{\frac{1}{\theta_T}} \left(C_{f,t}^{N,T}\right)^{\frac{\theta_T-1}{\theta_T}} + \left(\alpha_w^T\right)^{\frac{1}{\theta_T}} \left(C_{w,t}^{N,T}\right)^{\frac{\theta_T-1}{\theta_T}} \right]^{\frac{\theta_T}{\theta_T-1}}. \quad (8)$$

Demand for tradable goods from the ROW in the treatment region by HtM households are then given by

$$C_{w,t}^{N,T} = \alpha_w^T \left(\frac{P_{w,t}^T}{P_t^T} \right)^{-\theta_T} C_t^{N,T}.$$

The labor market is competitive in our baseline.

3.3. Final goods firms

A final goods firm in each sector (tradable and non-tradable sectors) aggregates intermediate goods from intermediate goods firms $i \in [0,1]$, so the aggregate output in the tradable and non-tradable sectors is given by;

$$Y_t^T = \left[\int Y_t^T(i)^{\frac{\epsilon_Y-1}{\epsilon_Y}} di \right]^{\frac{\epsilon_Y}{\epsilon_Y-1}},$$
$$Y_t^S = \left[\int Y_t^S(i)^{\frac{\epsilon_Y-1}{\epsilon_Y}} di \right]^{\frac{\epsilon_Y}{\epsilon_Y-1}}.$$

We can then derive demand for product i in each sector from profit maximization of the final goods firm. We define total output as the sum of sectoral output evaluated at the steady-state prices.

3.4. Intermediate goods firms

There is a continuum of intermediate goods producing firms in each sector, $i \in [0,1]$. Each firm i in the tradable sector produces a differentiated good with the following production function:

$$Y_t^T(i) = A_t^T L_t^{A,T}(i)^{\alpha_L}, \quad (9)$$

where A_t^T denotes productivity in tradable sector, and $L_t^{A,T}(i)$ is labor hired in firm i. We note that with our focus on the short run, we do not model capital accumulation.

Similarly, the production function for intermediate goods firms in the non-tradable sector is given by $Y_t^S(i) = A_t^S L_t^{A,S}(i)^{\alpha_L}$.

Intermediate goods firms in each sector face nominal price rigidities, *ala* Calvo. In particular, there is a probability θ_P^T (θ_P^S) that firms in the tradable (non-tradable) sector can reset prices in

each period. A fraction $(1-\theta_p)(1-\omega_{bl})$ resets prices optimally. Then a fraction $(1-\theta_p)\omega_{bl}$ resets using a rule based on last period reset national price and inflation. These assumptions lead to New Keynesian Phillips curves in each sector.

3.5. The rest of the world

We assume the ROW block is large and the majority is locally produced within the ROW. The ROW price level is in USD. We also assume for simplicity that there is only a tradable sector in the ROW. Cash transfers are financed by the ROW, and the ROW sells and buys Malawi's tradable goods. Then, ROW's demand for the treatment region's tradable goods per person, $X_{h,t}^{T,rw}$, is given by

$$X_{h,t}^{T,rw} = \left(\frac{\tau_t P_{h,t}^{T,rw}}{P_t^{T,rw}}\right)^{-\theta_T^{rw}} \widetilde{X}_{h,ss}^{T,rw}, \tag{10}$$

where $P_{h,t}^{T,rw}$ is the price of treatment region's tradable goods in the ROW, θ_T^{rw} is the elasticity of substitution between tradable goods of different origins in the ROW, $\widetilde{X}_{h,ss}^{T,rw}$ is a steady-state scaling parameter, and τ_t is a gross export tax used to model a parallel exchange rate in Section 7, but is inactive ($\tau = 1$) in our default calibration. We assume that the law of one price holds, i.e. $ex_t P_{h,t}^{T,rw} = P_{h,t}^{T}$. The real exchange rate between the treatment region and ROW, q_t^{rw}, is given by $\frac{ex_t}{P_t} P_t^{T,rw}$.

Similarly, the demand for the control region's tradable goods in the ROW block, $X_{f,t}^{T,rw}$, is given by

$$X_{f,t}^{T,rw} = \left(\frac{\tau_t P_{f,t}^{T,rw}}{P_t^{T,rw}}\right)^{-\theta_T^{rw}} \widetilde{X}_{f,ss}^{T,rw}, \tag{11}$$

and the real exchange rate between the control region and ROW, q_t^{rw*}, is given by $\frac{ex_t}{P_t^*} P_t^{T,rw}$.

We assume that there is zero inflation in the ROW, without loss of generality. As Ricardian households in both the treatment and control regions can trade USD-denominated non-state-contingent bonds, we assume a country-level debt-elastic interest rate for the small open economy as follows:

$$R_t^{rw} = \overline{R}^{rw} \Phi_{R^{rw}} \left(\frac{(1-\omega)\, n B_{w,t+1} + (1-\omega)(1-n)\, B_{w,t+1}^*}{P_t^{rw}}\right), \tag{12}$$

where R_t^{rw} is the nominal interest rate in USD for domestic households, $\overline{R}^{rw}$ is the nominal interest rate in USD in ROW, and as before $B_{w,t+1}, B_{w,t+1}^*$ are nominal ROW bonds held by the treatment and control regions, respectively, and $\Phi_{R^{rw}}()$ is a decreasing function.

3.6. Market clearing conditions

First, output markets clear in each sector in each region. In particular, in the treatment region, the market clearing conditions for output in tradable and non-tradable sectors are given by

$$\begin{aligned} nY_t^T &= nC_{h,t}^T + (1-n)\, C_{h,t}^{T*} + nX_{h,t}^{T,rw} \\ &= n\left((1-\omega)\, C_{h,t}^{R,T} + \omega C_{h,t}^{N,T}\right) + (1-n)\left((1-\omega)\, C_{h,t}^{R,T*} + \omega C_{h,t}^{N,T*}\right) + nX_{h,t}^{T,rw}, \qquad (13) \\ nY_t^S &= nC_{h,t}^S + (1-n)\, C_{h,t}^{S*} + nX_{h,t}^{S,rw} \\ &= n\left((1-\omega)\, C_{h,t}^{R,S} + \omega C_{h,t}^{N,S}\right) + (1-n)\left((1-\omega)\, C_{h,t}^{R,S*} + \omega C_{h,t}^{N,S*}\right) + nX_{h,t}^{S,rw}. \qquad (14) \end{aligned}$$

Second, the domestic bond market clears as follows:

$$(1-\omega)\, nB_{t+1} + (1-\omega)\,(1-n)\, B_{t+1}^* = 0. \qquad (15)$$

3.7. Monetary policy

Monetary policy in the small open economy follows the following Taylor rule:

$$\hat{R}_t^{agg} = \rho_R \hat{R}_{t-1}^{agg} + (1-\rho_R)\left(\phi_\pi \hat{\pi}_t^{agg} + \phi_Y \hat{Y}_t^{agg} + \phi_{ex} \hat{ex}_t\right), \qquad (16)$$

where R_t^{agg} is the interest rate common to both regions, and we assume that the monetary policy authority responds to inflation, the output gap, and the nominal exchange rate.

3.8. Fiscal policy

There is a one-time untargeted transfer from the ROW to all households in the treatment region.

4. Calibration

This section discusses the calibration of our model. We exploit the microdata collected through teh GiveDirectly RCT surveys in Chiradzulu and Khongoni to calibrate key parameters such as price setting, the fraction of hand-to-mouth households, and the local content of consumption in the treatment region.

4.1. Price stickiness

We calibrate the fraction of firms that do not adjust prices to the average age of prices, so $\theta_p = 0.5^4 = 0.0625$ from the enterprise survey, implying that almost all prices adjust annually.

The share of rule-of-thumb indexers is calibrated to the enterprise survey on the hypothetical demand shock question. Specifically, among those firms that can reset prices, 80% are rule-of-thumb indexers, i.e. $\omega_{bl} = 0.8$, compared with 25–50% in the United States as in Galí and Gertler (1999). As we show below, these calibrated parameters imply that prices are quite sticky in the first year with little first-year inflation. However, inflation is persistent as in the aggregate price data in Malawi, which has important implications for the effects of cash transfers at horizons beyond the first year.

4.2. Fraction of hand-to-mouth households

To calibrate ω, we take two different approaches to inform us about the fraction of hand-to-mouth households. First, following the literature, we calibrate the HtM share as the fraction of the population that lacks liquid assets that could be accessed in an emergency. We use a cutoff of 50,000 Kwacha (roughly USD 30), which is 1/20 of GNI per capita, representing a few weeks' income.[8] In the Chiradzulu household survey, we find that roughly 95% of respondents report having less than US$30 in savings, and so we calibrate $\omega = 0.95$.[9] We use a consistent approach to calibrate the share of HtM households in the rest of Malawi, $\omega^\star = 0.63$, taken from Global Findex 2017 by Demirguc-Kunt et al. (2018).

An alternative approach is to try to measure the fraction of households that display HtM *behavior*, such as spending temporary transfers. Appendix Figure C4 reports estimates by Egger et al. (2025) of the MPC from large GD one-time transfers in the Khongoni subdistrict of Malawi.[10] The estimates suggest that almost all of the large transfer was spent within the year, consistent with an HtM share close to one. As a cross-check, note that the treatment areas in Khongoni and Chiradzulu are very poor, with only 15% of households having electricity, so a high HtM share seems reasonable.

4.3. Home bias in the treatment region

We calibrate the home bias in consumption to 0.57 for Chiradzulu. We define "home" geographically as the Traditional Authority (TA), a sub-district administrative unit containing, on average,

[8] 1/20 GNI per capita is a cutoff used in the Global Findex question on the ability to come up with emergency funds. This cut off has been used by Bracco et al. (2021), Mendes et al. (2026) and Mendes and Pennings (2025) as an internationally comparable measure of the amount of liquid assets.

[9] This is calculated from CDF of baseline household survey variable s4_total_savings_amou as the rounded average of the Phase I survey in South Chiradzulu (99.9%) and the Phase II survey in North Chiradzulu (88%).

[10] Recall that in Khongoni subdistrict all adults received a large transfer, though the timing of the transfers was randomized. This results in less precise estimates over time as the control group receives transfers.

90 villages. Home bias is defined as the fraction of total household expenditure that generates income within the household's own TA. We examine the robustness of this geographic definition in Section 8.

The calibration combines information from our two main micro datasets: the household and enterprise baseline surveys. We estimate home bias separately for Southern and Northern Chiradzulu and report the midpoint between the two estimates; the full breakdown is provided in Appendix A. Estimating the home bias parameter requires three objects. First, we use the household survey to identify where purchases are made and how expenditure is distributed across locations and sectors. Second, we use the enterprise survey to estimate the residential composition of sellers in each location, which determines the share of expenditure accruing to residents of the household's TA. Third, we adjust for imported intermediate inputs to recover the local content of each dollar received by local sellers, including labor compensation, profits, and locally sourced intermediate inputs. To improve the accuracy of the estimates and the assumptions underlying them, we categorize expenditure into three sectors: food, non-food, and services. We then aggregate the resulting local content across sectors and purchase locations to obtain a measure of home bias that is representative of Chiradzulu as a whole (see Appendix Table A1).

This procedure yields a home bias estimate of 0.57. We use this estimate to calibrate $\alpha_C = 0.43 = 1 - 0.57$, assuming no home bias for tradable goods. Details on the procedure and estimates are presented in Appendix A. Our estimate is lower than the one calculated by Egger et al. (2022) for the Siaya region of Kenya, a comparison discussed further in Section 8.

4.4. Foreign export shares

We also calibrate steady-state trade flows between Malawi and the ROW as follows. In the last five years, exports and imports in Malawi account for 11% and 31% of GDP, respectively. Since our model assumes balanced trade in the steady state, we simply assume that half of the traded goods in consumption are imported from abroad. Given that the traded share of consumption is ($\alpha_C = 0.43$), this calibration implies that exports and imports each account for 21.5% of GDP in the steady state.

4.5. Financial stress parameterization

Given the information from the Phase II household baseline survey from Northern Chiradzulu District, detailed in Appendix B, we calibrate three parameters: the (pre-normalization) steady-state stress level $\bar{D}^N$, the sensitivity of financial stress to asset holdings, ϕ_D, and the size of the

transfer relative to annual household consumption, NTR_t^N/C_{ss}.[11] First, we calibrate $\bar{D}^N$ so that households spend 30% of their time distracted in steady state. Second, the ratio NTR_t^N/C_{ss} is set to be one, since the average transfer to households is roughly equivalent to one year of household consumption expenditure. Finally, we set $\phi_D = 1$, so that the level of financial stress is zero when households receive the GD transfer. We note that while we observe a large decline in stress in the cross-sectional household survey even for a much smaller variation in the availability of funds, which suggests a larger value of ϕ_D, our baseline calibration of ϕ_D assumes that the large increase in cash-in-hand generated by the transfer only helps to eliminate the 30% distracted time in the steady state.[12]

4.6. Other parameters

The rest of the calibrated parameters are reported in Table 1. Since the model is calibrated at annual frequency, we set β to be 0.96. We impose the following values for the utility function, following Bilbiie (2009) and Furlanetto and Seneca (2014): the Frisch elasticity of labor supply is set to be 1, the intertemporal elasticity of substitution is 1, and the parameter governing the wealth effect on labor supply is 0.65.[13] These parameters, together with the steady-state consumption share, fully characterize household preferences to a first-order approximation. In the baseline, the size of the treatment region is $n = 1/200$, reflecting the size of the Chiradzulu district relative to Malawi.

We assume that the elasticity of substitution between tradable and non-tradable consumption, θ_C is 1, so consumption is a Cobb-Douglas function of tradable and non-tradable consumption. The elasticity of substitution between treatment region, control region and the rest of the world consumption for each type of consumption goods, θ_T, is set to be 2. As Malawi's main exported goods are agricultural products such as raw tobacco, we set the elasticity of substitution for export demand from the ROW to be 2.

Besides the fractions of firms adjusting prices every period and the rule-of-thumb firms, we set

[11] Note that $D(M_{ss}^N) = \bar{D}^N$ + the normalization term that ensures a symmetric steady state across households even though only hand-to-mouth households experience stress-induced disutility $\bar{D}^N$.

[12] Because we impose a small value of ϕ_D, financial stress has a small effect on the size of the local multiplier. However, when a smaller transfer relative to income can reduce financial stress substantially, which implies a much larger ϕ_D, such as 11.9 as in the case of the United States reported in Sergeyev et al. (2024), financial stress plays a larger quantitative role, especially in a flexible price environment.

[13] As in Bilbiie (2009) and Furlanetto and Seneca (2014), we do not specify the functional form for the utility function. We note that the parameter governing the wealth effect on labor supply is 1 if the utility function is the standard separable utility function, and 0 in the case of Greenwood et al. (1988) preferences.

the elasticity for differentiated goods to be 21. In the production function, the elasticity of labor α_L is set to be 0.66.

We maintain the assumption that both Ricardian and hand-to-mouth households receive the same amount of profits from firms. Monetary policy rule parameters are standard, where interest rate persistence, ρ_R, is set to be 0.8, and the parameters governing reaction to inflation and output gap, ϕ_π and ϕ_Y, are 1.5 and 0.5, respectively. In the baseline, we assume that the central bank does not control exchange rates.

Table 1: Model Parameters and Calibrated Values

Parameter	**Value**	**Explanation**
β	0.96	Discount rate (time is annual)
σ	1	Inverse of IES parameter
γ_u	0.65	Measure of wealth effect parameter
ψ	1	Inverse of Frisch elasticity parameter
n	1/200	Relative size of home state
α_C	0.43	Share of tradable goods in consumption
$\alpha_w^T, \alpha_w^{T*}$	0.5	Import shares from ROW for tradable consumption
α_h^T	$n(1-\alpha_w^T)$	Home bias for tradables
α_f^T	$1-\alpha_h^T-\alpha_w^T$	Foreign share for tradables
α_f^S	$1-\alpha_h^S-\alpha_w^S$	Foreign share for non-tradables
θ_C	1	Elasticity of substitution between T and S
θ_T	2	Elasticity between treatment and control regions
$\theta_{T,rw}$	2	Export elasticity
ϵ_Y	21	Elasticity for goods variety
$\theta_{P,T}$, $\theta_{P,S}$	0.0625	Prob. not adjust price for tradables and nontradables
ω_{bl}^T,ω_{bl}^S	0.8	Fraction of backward-looking pricing firms
α_L	0.66	Production function labor elasticity parameter
ω	0.95	Hand-to-mouth share (treatment)
$\omega^\star$	0.63	Hand-to-mouth share (control/Rest of Malawi)
ω_T, ω_Π	ω	Allocation of transfers and profits between households
$\phi_{R,rw}$	-0.0001	Risk premium elasticity
ρ_R	0.8	Persistence parameter of interest rate
ϕ_π	1.5	Taylor rule parameter (inflation)
ϕ_Y	0.5	Taylor rule parameter (output)
ϕ_D	1	Elasticity for financial stress

5. The Local Transfer Multiplier

This section characterizes the effects of cash transfers on the treatment region's local economy. We first build intuition through analytical results, then quantify the effects in our full model.

5.1. Analytical Results & Intuition

We derive analytical expressions for the local multiplier, defined as the change in local GDP when the treatment region receives an extra \$1 in cash transfers relative to the rest of the economy. To that end, we simplify the model by assuming (i) separable preferences ($\gamma_u = \sigma$), and (ii) no non-traded services sector ($\alpha_C \to 1$). In this simplified model, local consumption home bias is represented by home bias in tradable consumption, $hb = \alpha_h^T$. Details are in Appendix D.[14]

Keynesian Local Multiplier. In the limit in which the treatment region becomes small relative to the national economy ($n \to 0$), prices and wages become fully rigid ($\theta_p \to 1, \theta_{rw} \to 1$) and households are patient ($\beta \to 1$), then the local multiplier for an untargeted one-time transfer takes a simple closed-form expression:[15]

$$\mathcal{M}_K^{Local} = \frac{\omega \times hb}{1 - \omega \times hb}, \tag{17}$$

Equation (17) captures a standard Keynesian demand multiplier logic. When hand-to-mouth households receive a \$1 transfer, they spend a fraction hb locally, generating $hb \times \omega$ dollars of local income. This additional income is in turn spent locally, and so on, giving rise to the geometric series $\omega \times hb + (\omega \times hb)^2 + \ldots = \frac{\omega \times hb}{1-\omega \times hb}$. For example, with $\omega = 1$ and $hb = 0.5$, the multiplier equals one. If home bias is higher, as in Egger et al. (2022)'s Kenyan setting where $hb \approx 0.75$, the multiplier rises to three.

Neoclassical Local Multiplier. Consider the opposite limit where prices are fully flexible ($\theta_p \to 0$) and all households are Ricardian ($\omega \to 0$), then the local multiplier is given by:

$$\mathcal{M}_N^{Local} = -\frac{\alpha_L (1 - \beta)}{1 + \psi}. \tag{18}$$

where ψ is the inverse Frisch elasticity, and α_L is the curvature of the production function, and β is the discount rate. The Neoclassical multiplier for a temporary transfer is negative but close to zero. Ricardian households only spend the permanent component of the transfer, $1 - \beta$, and save the rest. Of the small amount they do spend, they want to spend a fraction on leisure, which reduces labor supply. This is the standard wealth effect on labor supply, which depends on the inverse

[14] The Keynesian closed-form expression also requires a labor union that sets $\widehat{L}_t^R = \widehat{LN}_t^d$ for all t. These are propositions 1a and 1b in Appendix D.

[15] The first assumption means the treatment region is effectively a small open economy trading with a much larger rest of Malawi and the world, and aggregate variables such as the exchange rate and interest rate are unaffected by the local transfer. A more general formulation for any β is $\frac{hb\left[(1-\beta)+\omega\,(\beta-hb)\right]}{(1-hb)(1-hb\,\omega)}$.

Frisch elasticity ψ with separable preferences. Reduced labor supply reduces output depending on the curvature of the production function α_L. In the background, any increase in local demand is offset by price adjustments rather than output expansion. With our default parameters of $\beta = 0.96$, $\alpha_L = 0.66$ and $\psi = 1$, $\mathcal{M}_N^{Local} = -0.01$: the fact that most of the transfer is saved ($1 - \beta = 0.04$) dominates quantitatively.

The role of each parameter. The contrast between these two limiting cases clarifies the key parameters driving the size of the local multiplier. Price stickiness determines whether the local economy responds to the transfer through quantities (the Keynesian channel) or prices (the neoclassical channel). When prices are sticky, firms respond to higher demand by producing more rather than raising prices, generating a positive output multiplier with little inflation. The hand-to-mouth share ω governs the marginal propensity to consume out of the transfer: hand-to-mouth households spend the transfer immediately, whereas Ricardian households smooth the temporary income gain over time, dampening the demand stimulus. Therefore, a larger fraction of hand-to-mouth households can increase the local output multiplier. Home bias hb determines the fraction of additional spending that falls on locally produced goods and thereby generates local income, rather than leaking out as imports from the control region or the rest of the world.

Intuition from the budget constraint. The transfer can also be understood through the lens of the household budget constraint. A dollar transfer financed by the rest of the world is equivalent to a gift of foreign goods that shifts out the household's budget constraint. However, at the original relative prices, households do not wish to spend the entire dollar on foreign goods—they want to allocate only a fraction $1 - hb$ to imports from the control region and the ROW. In the Keynesian model, local GDP expands until households want to import exactly one dollar from the control region/ROW: $(1 - hb)(\Delta Y + 1) = 1$. Thus, output expands by $\Delta Y = hb/(1 - hb)$. In the Neoclassical model, instead of output adjusting, relative prices of foreign goods fall (the real exchange rate appreciates) until households are willing to spend the full transfer on imports.

5.2. Quantitative Local Multipliers

This section presents the model's predictions for local multipliers when the treatment region is small relative to the national economy, as in the Chiradzulu RCT where $n \approx 1/200$.

Figure 1 plots the first-year local output multiplier along with the first-year local inflation across parameterizations. In the baseline calibration, the model implies a local output multiplier of 1.09,

with small local inflation of about 3 percentage points. That is, for every dollar of cash transfers received by the treatment region relative to the control region, local output increases by roughly one dollar. The small inflationary response reflects the fact that most firms do not adjust prices optimally in response to the demand shock, consistent with the micro evidence from the Khongoni pilot and the Chiradzulu enterprise survey.

The impact multiplier captures nearly all of the output response: there are few later-year dynamics in local output. The cumulative multiplier, defined as the ratio of cumulative output gains to cumulative transfers, remains close to the impact multiplier. This is because the one-time transfer generates little persistent demand stimulus beyond the first year. Price indexation does, however, generate mild but persistent local inflation, consistent with the high autocorrelation of inflation observed in Malawi's aggregate data (see Section 8 for a discussion).

Figure 1 also plots how the local multipliers depend on the degree of price stickiness (or indexation), the hand-to-mouth fraction and the degree of home bias for local goods. Consistent with the above intuition, the model with flexible prices produces a negative local output multiplier and high inflation. The reason is that firms raise prices in response to higher local demand, dampening the demand channel and driving up inflation. In addition, Ricardian households save and decrease labor supply due to wealth effects, which leads to a drop in local output.

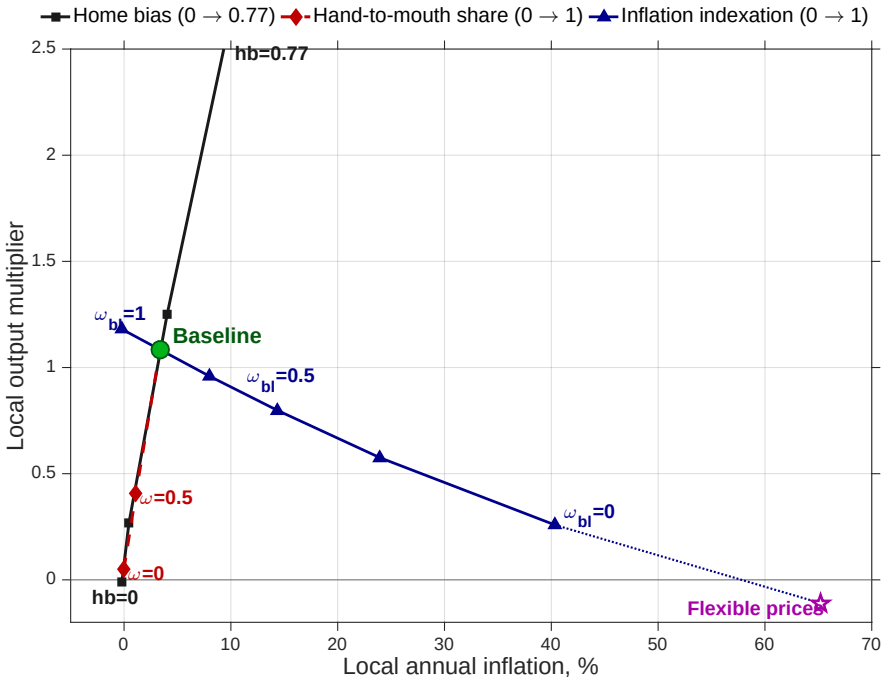
The size of the local multiplier also depends on the degree of inflation indexation. In fact, when the degree of indexation falls, i.e. ω_{bl} goes from 1 to 0, the on-impact local multiplier approaches the flexible price local multiplier and inflation increases compared to the baseline calibration. Intuitively, as inflation indexation falls, more firms reset prices optimally, and the New Keynesian demand channel weakens, which lowers the local output multiplier and increases inflation.

Finally, the local output multiplier can be close to zero if there are no hand-to-mouth households in the treatment region. Intuitively, Ricardian households save the one-time transfer, instead of demanding more goods, causing local output (and inflation) not to change by much. Finally, the also suggests that if the treatment region is more closed and most of the goods consumed are locally produced, i.e. hb is large, the impact of a one-time cash transfers to a Malawian village can be much larger.

5.2.1. Comparison with Egger et al. (2022)

To understand whether our baseline local output multiplier of 1.09 is reasonable, we compare our model's predictions with the empirical estimates from Egger et al. (2022)'s RCT of GiveDirectly

Figure 1: Local output multiplier versus local inflation across parameterizations



Notes: The figure plots the local output multiplier against local inflation in the first year across alternative model parameterizations. Each point corresponds to a different combination of the hand-to-mouth share, price stickiness, and home bias. The baseline calibration yields a multiplier of approximately one with limited local inflation. The baseline uses $hb = 0.57$, $\omega = 0.95$, $\omega_{bl} = 0.8$, and $\theta_P = 0.06$. The parameter grid varies home bias from 0 to 0.77, the hand-to-mouth share from 0 to 0.95, and inflation indexation from 0 to 1. The flexible-price case sets $\theta_P = 0$ and $\omega_{bl} = 0$.

transfers in rural Kenya in Table 2. The model-implied local output multiplier of 1.09 is smaller than the headline estimate of 2.58 in Egger et al. (2022), though the difference is only a bit over one standard error (s.e. = 1.44). However, the consumption multiplier is *nearly identical* across the two settings: approximately 2 in both the Kenyan RCT and our model.

The first difference between our estimate and theirs is the home bias assumption. Our model can generate a local output multiplier of nearly 2.5 if the home bias parameter is raised from our baseline of $hb = 0.57$ to approximately 0.75. This is consistent with the higher home bias reported in Egger et al. (2022)'s Kenyan setting, where the relevant geographic unit is larger and more self-contained. See Section 8.2 for a further discussion.

The second difference lies in the composition of expenditure beyond consumption. First, Egger et al. (2022) find a positive investment and inventory response of 0.55, which our model abstracts from since we focus on the short run without capital accumulation. Second, the model predicts a large increase in imports from the control region and the rest of the world, generating net exports

Table 2: Comparison with Egger et al. (2022): GDP Accounting Decomposition

	Egger et al. (2022) – Kenya		NK Model
	Main Text	Import Adjusted	(This Paper)
GDP	**2.58**	**2.05**	**1.09**
Consumption	2.04	1.65	2.01
Non-Tradable Consumption			1.13
Tradable Consumption			0.88
Investment & Inventories	0.55	0.41	0
Net Exports	**0**	**-0.53**	**-0.92**
Exports (ROW+Control Region)	0	0	-0.04
Imports (ROW + Control Region)	0	0.53	0.88

Source: Egger et al. (2022) Appendix Table D3. Estimates per unit of transfers. G=0

of -0.92. This reflects a basic accounting identity in the New Keynesian model: unless the transfer is saved or prices adjust substantially, the net export response must be close to -1. It is difficult to measure exports and imports in the context of Egger et al. (2022), though they do include an extension that incorporates an import adjustment, which results in a net export response of -0.53, moving their empirical and our model estimates closer together.[16]

6. Aggregate and Spillover Multipliers — The General Case

We now turn from the local multiplier—which an RCT can estimate—to the spillover and aggregate multipliers, which cannot be identified experimentally but are central for policy. We define three objects. The *local multiplier* is $\frac{\Delta Y_h}{\Delta Tr_h}$, the focus of the previous discussion. The *spillover multiplier* is $\frac{\Delta Y_c}{\Delta Tr_h}$, capturing the spillover effect of the transfer in the treatment region on output in the control region. The *aggregate multiplier* is then the sum of the two multipliers, $\frac{\Delta Y_h}{\Delta Tr_h} + \frac{\Delta Y_c}{\Delta Tr_h}$, measuring the effect on national output of a dollar spent in the treatment region. Although the change in control-region output is small in percentage terms, since the control region is much larger than the treatment region, the dollar-valued spillover can be substantial and can change the size and sign of the aggregate multiplier.

This section analyzes how the external macroeconomic environment influences the size of the multiplier along two dimensions: the ability to save and lend internationally, i.e. capital account (KA) is closed or open, and the exchange rate regime (ER), i.e. the nominal exchange rate is fixed or flexible. While Malawi is currently closer to a closed KA regime, we consider a range of regimes as (i) Malawi has changed its macro environment over time, and (ii) other countries that receive GiveDirectly transfers have different regimes, for example, Kenya is closer to an open-KA,

[16] Another difference is dynamics. We only consider the effect in the first year, whereas Egger et al. (2022)'s estimates cover a 27-month period. Over the first year, Egger et al. (2022) find an expenditure multiplier of ≈ 1.5, not far from the 1.1 here.

flexible-ER regime.[17] To impose a closed KA, we set an insurmountable debt elastic interest spread on foreign bonds $\Phi'_{Rw}() \to -\infty$, while this parameter is close to zero in the open KA. We impose a fixed ER regime by setting $\phi_{ex} \to \infty$ in the Taylor rule, whereas with a flexible ER $\phi_{ex} = 0$, i.e. the fixed ER regime implies that the central bank raises (lowers) interest rates aggressively in response to a nominal depreciation (appreciation).

6.1. Analytical Results & Intuition

We first build intuition for how the macroeconomic policy environment and parameters can affect the aggregate multiplier of cash transfers by deriving analytical expressions for the aggregate multiplier in a simplified version of the model.

6.1.1. Neoclassical Aggregate Multiplier

The neoclassical model provides an analytical benchmark for the aggregate effects of cash transfers in the absence of frictions. It also provides a guide to the expected impacts of cash transfers in countries with more neoclassical features, such as flexible prices and exchange rates, and the contributions of such frictions relative to the benchmark in other countries.

Consider a country with an open capital account, in which the exchange rate and prices are fully flexible ($\theta_p \to 0$), preferences are separable, and all households are Ricardian ($\omega \to 0$). Then the aggregate multiplier is given by:

$$\mathcal{M}^{Agg}_{N,Open} = -\frac{\alpha_L(1-\beta)}{1+\psi}. \tag{19}$$

Equation 19 suggests that the *aggregate* effects of cash transfers are negative (due to wealth effects) but small (as the transfers are mostly saved).[18] This expression is identical to the *local* neoclassical multiplier in Equation 18 ($\mathcal{M}^{Local}_{N}$), which also means that spillovers to the control regions are *exactly zero*. That is, the effects of cash transfers in an open economy neoclassical model are entirely due to their direct effects on recipient regions.

To isolate the effects of international capital market frictions, we can derive the analogous neoclassical multiplier in an economy with a closed capital account:

$$\mathcal{M}^{Agg}_{N,Clsed} = -\frac{\alpha_L}{1+\psi} \tag{20}$$

[17] See International Monetary Fund (2024).

[18] Recall β is the discount rate, ψ is the inverse Frisch elasticity and α_L is the curvature of the production function.

This is $1/(1-\beta)$ times the multiplier in Equation 19. The $(1-\beta)$ disappears because restrictions on international bonds force Malawian households to spend the transfers in aggregate. The takeaway is that a closed capital account can substantially amplify the negative impacts of transfers on output — for example, a 25-fold amplification (with $\beta = 0.96$). This also serves as a lower bound on the aggregate multiplier.

6.2. Keynesian Aggregate Multiplier

The Keynesian limit of our model with rigid prices shows which economic features are important for the aggregate multiplier, and how these differ from those determining the local multiplier. The takeaway is that even relying on Keynesian mechanisms, a large local multiplier does not necessarily generalize to a large aggregate multiplier.

As prices become rigid, households become patient, and under an open-capital account with a fixed ER, and some other conditions, the aggregate Keynesian multiplier is given by:[19]

$$\mathcal{M}_K^{Agg} = \frac{\omega \times hb^{Agg}}{1 - \omega \times hb^{Agg}} \tag{21}$$

where $\omega = \omega^\star$ is the share of HtM HHs, and $hb^{Agg} = 1-\alpha_{rw}$ is *aggregate* home bias—the fraction of total Malawian consumption that falls on domestic goods. Equation (21) is of the same form as the local Keynesian multiplier in Equation (17) and captures the previous Keynesian demand multiplier logic at the national level.[20]

However, the different variables and conditions highlight that a large local multiplier does not guarantee a large aggregate multiplier. Most saliently, Equation (21) depends on national home bias, whereas Equation (17) depends on regional home bias. Consequently a transfer program in a closed or remote region of an otherwise open country would generate a large local multiplier but small aggregate multiplier—even under Keynesian mechanisms. Moreover, a large aggregate Keynesian multiplier *also* requires a fixed ER and an open capital account, which are absent from Equation (17). The fixed ER and open capital account help to maintain relative prices between domestic and ROW goods, ensuring that higher demand from the transfer leads to an increase in

[19] This expression also requires a simplified no-services model, symmetry across treatment and control regions (especially $\omega = \omega^\star$) and a labor union that imposes $\widehat{L}_t^R = \widehat{LN}_t^d$, but unlike the local multiplier expressions, these multiplier expressions hold for any n.The more general case for any β is $\frac{hb^{Agg}\left[(1-\omega)(1-\beta)+(1-hb^{Agg})\,\omega\right]}{(1-hb^{Agg}))\left[1-hb^{Agg}\,\omega\right]}$.

[20] That is, when households receive a transfer, a fraction $\omega \times hb^{Agg}$ is spent on domestic goods. Of this, $\omega \times hb^{Agg}$ is spent domestically and so on, generating the standard MPC/(1-MPC) multiplier.

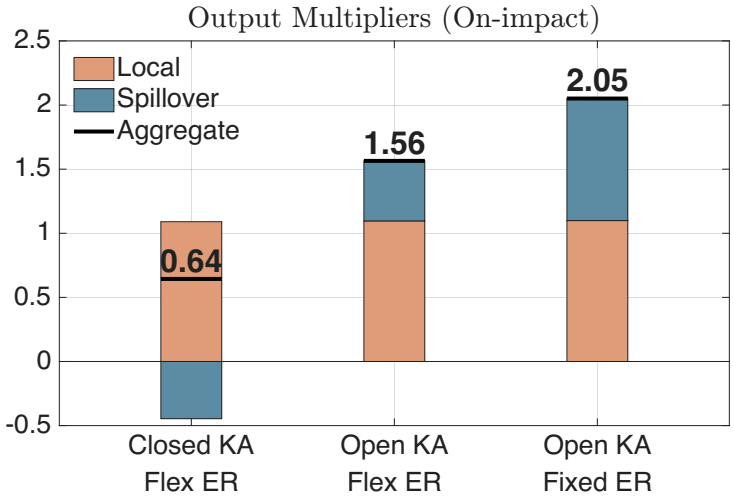
quantities rather than a change in prices. Consequently, a large local multiplier in a country with a closed capital account is no guarantee of a large aggregate multiplier, even if prices are very sticky.

6.3. Quantitative Results

Figure 2 reports the local, spillover, and aggregate multipliers on impact under these three macroeconomic policy regimes. A key finding is that while the local multiplier is essentially unaffected by the macro-policy regime, the spillover and aggregate multipliers are highly sensitive to the capital account and exchange rate regime. Under a closed capital account (the first bar), the spillover multiplier is about -0.45, which means that for every $1 of GD transfer to the residents of the home region in the first year, output in the control region, i.e. the rest of Malawi, falls by $0.45. Combining the positive and unchanged local multiplier of 1.09 and the spillover multiplier of -0.45, the aggregate multiplier is 0.64, around half the local multiplier.

However, spillover and aggregate multipliers are much larger when the capital account is open, as plotted in the rest of Figure 2. Opening the capital account while keeping the ER flexible *flips* the sign of the spillover multiplier from -0.4 to 0.47, so the aggregate multiplier is now 1.56. Fixing the exchange rate in the final bars further boosts the spillover multiplier to 0.95, such that the aggregate multiplier is now 2.05, with almost equal contributions from the local and spillover multipliers. We note that the benefits of the open capital account with fixed ER regime fade at longer horizons, as discussed in Section 8.

Figure 2: Local, spillover, and aggregate multipliers under alternative macro-policy regimes



Notes: The three regimes along the x-axis are: closed capital account and flexible exchange rate, open capital account and flexible exchange rate, and open capital account and fixed exchange rate.

Why does the model generate these marked differences in the aggregate with different capital

account and exchange rate regimes? Intuitively, cash transfers lead to positive or negative spillovers to the rest of the country because of two opposing forces. On the one hand, there is a positive spillover effect: cash transfers in the treatment region increase the treatment region's demand for the control region's goods. Because prices are sticky, an increase in demand for control region goods leads to an increase in control region tradable output. On the other hand, there is also a negative spillover effect: cash transfers lead to a foreign currency inflow, causing the exchange rate to appreciate and reducing the control region's competitiveness. As a result, export demand falls, causing the control region's economy to contract. In equilibrium, depending on which force is stronger, output in the control region may increase or decrease in response to the cash transfer in the treatment region.[21]

The macro-policy regime is important because it determines the size of the exchange rate appreciation, and hence whether the positive demand spillover channel or the negative export-competitiveness channel dominates. To see this, it is useful to consider the balance of payments (BoP) identity. In our model, cash transfers are a USD-denominated inflow from the rest of the world. The BoP requires that total outflows equal total inflows:

$$\underbrace{\Delta\text{Imports}}_{\text{(A)}} \underbrace{-\Delta\text{Exports}}_{\text{(B)}} + \underbrace{\Delta\text{International Bond Purchases}}_{\text{(C)}} = \underbrace{\text{ER Revaluation}}_{\text{(D)}} + \underbrace{\text{Cash Transfer}}_{\text{(E)}}. \tag{22}$$

The cash transfer component (E) is exogenous, so the remaining four components must adjust to satisfy the identity. The key insight is that if imports (A) or international bond purchases (C) increase sufficiently to absorb the cash transfer inflow, then the exchange rate need not appreciate (D≈0) and exports need not fall (B≈0)—and hence there is no negative spillover to the control region.[22]

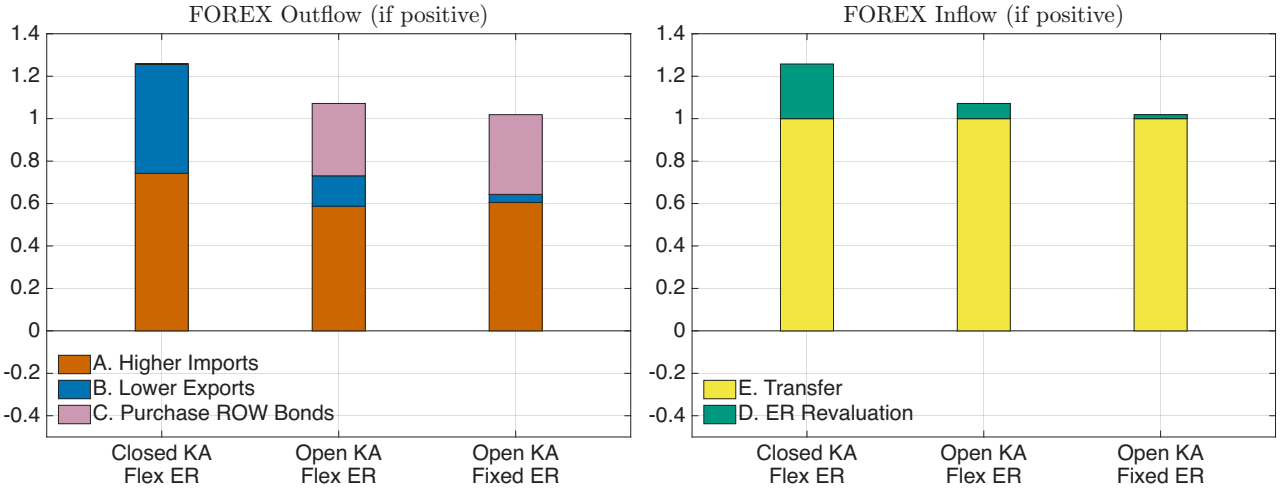
Which components adjust and by how much depend on the capital account and exchange rate

[21] The empirical literature provides different estimates of the effects of fiscal policy on the real exchange rate in developing countries. For example, while Miyamoto et al. (2019) document that government spending shocks tend to appreciate the real exchange rate in developing countries, Jarotschkin and Kraay (2016) find no evidence of real appreciation due to foreign aid.

[22] Component D of equation 22 captures the increase in export revenues driven by higher prices from ER appreciation, holding fixed the quantity of exports.

regimes. We plot in Figure 3 the quantitative implications of the model for these BoP components.[23]

Figure 3: Decomposition of the aggregate multiplier by component (imports, exports, exchange rate, domestic demand) under closed capital account, open capital account with floating ER, and open capital account with fixed ER.



6.3.1. Closed capital account

When the capital account is closed, the spillover multiplier is negative, and the aggregate multiplier is lower than the local multiplier. With no international bond purchases ($(C) = 0$ in equation 22), the entire GD inflow must be absorbed through the current account. The excess demand for Malawian Kwacha (MWK) causes the nominal exchange rate to appreciate (D>0). Intuitively, the increase in transfer leads to an increase in demand for imports, so (A) goes up, but with the national home bias of Malawi to be 0.785 and households cannot save ($C = 0$), the change in imports is less than the transfer, which leads to a large appreciation of the exchange rate. This appreciation reduces foreign demand for Malawian exports (B<0), generating a negative demand shock for the control region. The Keynesian multiplier then works *in reverse* in the control region: falling export revenue reduces income, which reduces spending, and so on, producing a negative spillover multiplier. The increase in imports (A>0)—driven by both the treatment region's higher spending and also substitution effects towards cheaper imports—is partially offsetting.

[23]Exports and Imports, (A) and (B) components, are computed as the sum of the responses of the treatment and control regions' goods with the rest of the world, $X^{T,rw}_{h,t}, X^{T,rw}_{f,t}$ and $C^{N,T}_{rw,t}, C^{R,T}_{rw,t}, C^{N,T*}_{rw,t}, C^{R,T*}_{rw,t}$, respectively, evaluated at the steady state prices. The international bond purchases component (C) is computed as the responses of international bond, B_{rw}, B^*_{rw} evaluated at $1/R_{ss}$. Finally, ER revaluation, (D), is computed as the value of exports at steady-state times the changes in relative prices between control and treatment region to the ROW.

6.3.2. Open capital account and the exchange rate regime

Opening the capital account changes the picture substantially (middle bars in both the left and right sides in Figure 3). Because of the one-time transfers, Ricardian households would like to save and can now purchase USD-denominated bonds ($C > 0$) in equation 22), smoothing the temporary GD inflow. These international bond purchases act as a capital outflow that absorbs about a third of the GD transfer, limiting the appreciation of the exchange rate (D). With a smaller appreciation, the fall in export demand is more muted compared to the closed capital account case, and so external sector impacts on demand in the control region are much smaller. In net, the boost to domestic demand from the transfer now exceeds the drag from reduced exports, turning the spillover multiplier positive and raising the aggregate multiplier above the local multiplier. Imports continue to increase (A) though are driven by higher higher domestic demand rather than through exchange rate movements.

Under a fixed exchange rate regime with an open capital account, the aggregate multiplier is even larger. Fixing the nominal exchange rate with sticky prices weakens the appreciation channel, so there is a small fall in exports. Intuitively, compared to the open capital account with flexible exchange rate, the central bank lowers the interest rate to fight the appreciation which encourages the purchase of foreign bonds.[24] The lower domestic interest rate also stimulates domestic demand relative to the flex-ER case, further boosting demand for imports, so imports in this case are higher (in quantities) than the flexible exchange rate case, helping to balance the BoP. The combination of no export drag and lower interest rates produces the largest aggregate multiplier among the three regimes.

7. Malawi Application: Aggregate Multiplier and the Macroeconomic Effects of Scaled-Up Cash Transfers

7.1. The Malawi Macroeconomic Environment

Malawi's macroeconomic policy environment is central to the size of the aggregate multiplier in this paper, and includes elements that are both common and uncommon among developing countries. Like many other developing countries, Malawi has an underdeveloped financial system and severely restricts capital flows (Berg et al. (2015)). For example, transactions in foreign assets require permission from the central bank, and the exchange rate appreciates during the tobacco

[24] That is, the interest rate increases under a floating-ER regime but is constant under a fixed-ER regime.

harvest, the country's main export crop, and depreciates at other times (Bangara (2019)). This seasonal pattern suggests that traders and investors have limited capacity to arbitrage foreign-exchange fluctuations over time, consistent with restrictions on capital mobility.[25] For these reasons, we model Malawi as a country with a closed capital account.

Malawi operates a stabilized ER regime with a large parallel-market premium (IMF (2025)).[26] In the final quarter of 2025, the parallel ER was around 4,500 MWK/USD, compared to an official rate of around 1,700 MWK/USD (Engel et al. (2025)), implying a parallel premium of 150%. Such a large parallel premium is now very rare, even among low-income countries. Malawi's monetary regime is also characterized by high inflation—around 25–30% in 2025—limited reserves, and perhaps fiscal dominance.

Given these economic conditions in Malawi, we consider two cases. The first case is our baseline model where the capital account is closed. The second case is an extended model where there is a parallel exchange rate regime, as the parallel rate is so large and GiveDirectly buys Kawacha at the official rate. We describe the extended model below.[27]

7.2. Parallel Exchange Rate Extension

We extend our model to capture the parallel exchange rate in Malawi as follows. IMF (2025) argues that the parallel rate in Malawi "acts as a tax on exporters and subsidizes imports", and this is exactly how we model it. Specifically, motivated by Pinto (1991), we assume that the government introduces a gross tax $\tau_t > 1$ on foreign-currency inflows by requiring exporters and GiveDirectly to exchange USD for Kwacha at the less favorable official ER (ex_t^O). The true floating exchange rate is the flexible parallel rate (ex_t), at which imports can be purchased. The size of the gross tax is the ratio of the official to the parallel rate, $\tau_t = ex_t/ex_t^O$, which in steady state equals its current value, $\tau_{ss} = 1 + 1.5$ (a 150% parallel premium).[28] A tax $\tau_t > 1$ increases the effective price of exports, reducing their demand in Equations 10 and 11 in Section 3. Following Pinto (1991), the government then uses the revenues to purchase a fixed USD value of imports, G^{USD}, for the population, for example fuel, fertilizer, and food, as in equation 23 (the price of imports is fixed at $1USD$). G^{USD} does not affect model dynamics because it is constant. The tax rate adjusts to

[25] See Malawi's Foreign Exchange Act No. 18 of 2025.

[26] Malawi officially has a floating ER with inflation targeting, though this is not how it operates in practice.

[27] We also modeled fiscal dominance along the lines of Leeper (1991), but as it does not have much effect on the transfer multiplier, we discuss this case in Appendix E. Our model also abstracts from high inflation, though we note that one of its main impacts is to induce households to spend transfers quickly before its real value is eroded.

[28] The gross tax collapses to 1 when the official and parallel rates are unified.

ensure Equation 23 holds period by period.

$$G^{USD} = (\tau_t - 1)\left[n\frac{P^T_{h,t}X^{T,rw}_{h,t}}{ex_t} + (1-n)\frac{P^T_{f,t}X^{T,rw}_{f,t}}{ex_t} + nTR^{USD}_t\right] \tag{23}$$

This set-up is optimistic for the aggregate multiplier because the implicit tax on GiveDirectly foreign-currency inflows reduces the tax distorting exports. An alternative assumption is that the government adjusts a combination of spending and the tax to maintain the official rate, which results in a boost to the aggregate multiplier about half as large (not reported).

7.3. Multipliers in Malawi with a parallel exchange rate

A parallel ER in Malawi increases the aggregate multiplier, but leaves local multipliers unchanged (measured at the official rate), as reported in Table 3. Specifically, when n is close to 0, the local multiplier is unchanged at 1.09. In contrast, the aggregate multiplier at $n \approx 0$ increases from 0.63 with a closed capital account to almost 0.86 with a parallel rate (measuring transfers at official exchange rate). The reason is that revenue from the implicit tax on the transfer is used to reduce the parallel premium, which boosts exports, and hence, output.[29]

Table 3: Local and aggregate multipliers as the treatment region scales up

	Local multiplier		**Aggregate multiplier**	
Specification	$n \approx 0$	$n \approx 0.15$	$n \approx 0$	$n \approx 0.15$
Baseline (Flexible ER)	1.09	0.86	0.63	0.31
Parallel ER (Official KW)	1.09	0.90	0.86	0.53
Parallel ER (Parallel KW)	0.43	0.36	0.34	0.21

Note: n is the size of the treatment region. The model for Malawi assumes a closed capital account. The first row has a single market-based floating ER. The second row has a parallel ER but values the cost of transfers at the official ER. The final row has a parallel ER but values the cost of transfers at the parallel ER.

We note that the existence of the parallel rate can also change how multipliers should be measured. Under the view that costs should be measured using the "true" market-determined parallel rate, all multipliers shrink toward zero—which reduces positive multipliers but increases negative multipliers—because the effective cost of the transfer is larger. For example, suppose adults *receive* a transfer of 1 million MWK, and this generates an increase in GDP of 1 million MWK, previously this would be measured as a multiplier of 1 (which is close to our estimate of the local multiplier). The transfer costs about $575, transacting at an official rate of 1730 MWK per

[29] Most of this adjustment occurs through a smaller appreciation of the parallel rate, though there is also a slight depreciations of the official rate. While the official rate is fairly persistent in practice, there are occasional depreciation, including in late 2023 (see Engel et al. (2025), Figure 1.17).

USD, but the $575 is worth around 2.5 million MWK at the parallel rate of 4500 MWK per USD, which means the local multiplier is not 1 but 0.4.[30] In this case, the aggregate multiplier at $n \approx 0$ falls from 0.86 to 0.34, as reported in the last row of Table 3.

7.4. Scaling up cash transfers in Malawi

This section presents the counterfactual using our framework to study how the macroeconomic effects of cash transfers change as the cash transfer program scales up.

7.4.1. Set-up

GiveDirectly's ambition is to provide transfers to all people in extreme poverty in Malawi, which is currently 75% of the population at a $3 per day PPP poverty line. However, this is a long-term goal, so instead we consider a more modest scale-up from $n = 1/200$ currently, representing the Chiradzulu region, to $n = 0.15$, which we denote in graphs with an orange vertical line. As transfers are about 70% of GDP in treatment villages, this would represent around 10% of national GDP. We also present the full range of outcomes through $n = 1$.[31]

In addition to an increase in n, the characteristics of the treatment and control regions likely change when the transfer program scales up. In the baseline, we calibrate the hand-to-mouth share of the treatment region $\omega = 0.95$, which is above that of Malawi as a whole, i.e. $\omega^\star = 0.63$. Hence, we need to make assumptions about the distribution of the HtM share across Malawi. Motivated by the literature and the goals of cash transfer providers, we assume that (i) transfers will expand progressively from the poorest to the richest areas as n increases and (ii) poorer areas have higher shares of HtM households. Specifically, we assume that the marginal share of HtM households falls from 0.95 among the poorest households to 0.31 for the richest.[32]

7.4.2. Results: Multipliers

Figure 4 plots the local and aggregate multipliers as a function of the expansion of transfers to a region of size n. The initial points close to $n \to 0$ are the baseline local and aggregate multipliers reported above.

[30] The same calculation can also be done where the increase in output of 1 million MWK is converted into USD at a constant parallel rate of 4500 MWK per USD and compared to the cost of USD575.

[31] Note that large transfers to a large fraction of the population in one year is likely unrealistic. However, there are many countries where a large fraction of the population receives cash transfers.

[32] The assumption of how the HtM share varies with income is consistent with microdata from 2017 World Bank Global Findex. We plot in Appendix Figure C1 the step function of the share of household that are unable to access emergency funds by income quintile. This falls from 80% of households in the poorest quintile to 40% of households in the richest quintile, and is broadly consistent with the marginal distribution that we assume in our counterfactual.

As the transfers scale up, there are two effects. First, the local multiplier converges to the aggregate multiplier. Intuitively, as the treatment region grows, it becomes a larger share of the national economy. The larger treatment region becomes more sensitive to macro policy variables like capital account openness and exchange rate regime. For $n \to 1$, local and aggregate multipliers must be the same as the treatment region becomes the whole of Malawi. This can be seen more clearly in a simple case in which we set $\omega = \omega^\star$, plotted in Appendix Figure C2: aggregate multipliers are unaffected by n, and the local multiplier moves towards the aggregate multiplier. Other things equal, this would suggest a decrease in the local multiplier in the closed-KA case.

However, the second effect as the program scales up comes from the fact that the HtM share in each of the treatment and control regions changes. As a result, the aggregate multiplier also changes as n increases.[33] As discussed earlier, the local multiplier falls with ω as transfers become less targeted at HtM households. However, the spillover multiplier also falls substantially with $\omega^\star$, as HtM amplifies the demand channel. In the closed KA case, the aggregate multiplier falls by 1.6 as $n : 0 \to 1$.

The quantitative implications of the macro policy environment are significant for a program of plausible scale. For example, at $n = 0.15$, indicated by the vertical orange line in Figure 4, the local multiplier is about 20 percent smaller than its village-level value under a closed capital account. Additionally, the aggregate multiplier at $n = 0.15$ is about half of the aggregate multiplier under $n \approx 0$. This result that the aggregate multiplier is smaller as n increases holds even for the case with parallel exchange rate regime.

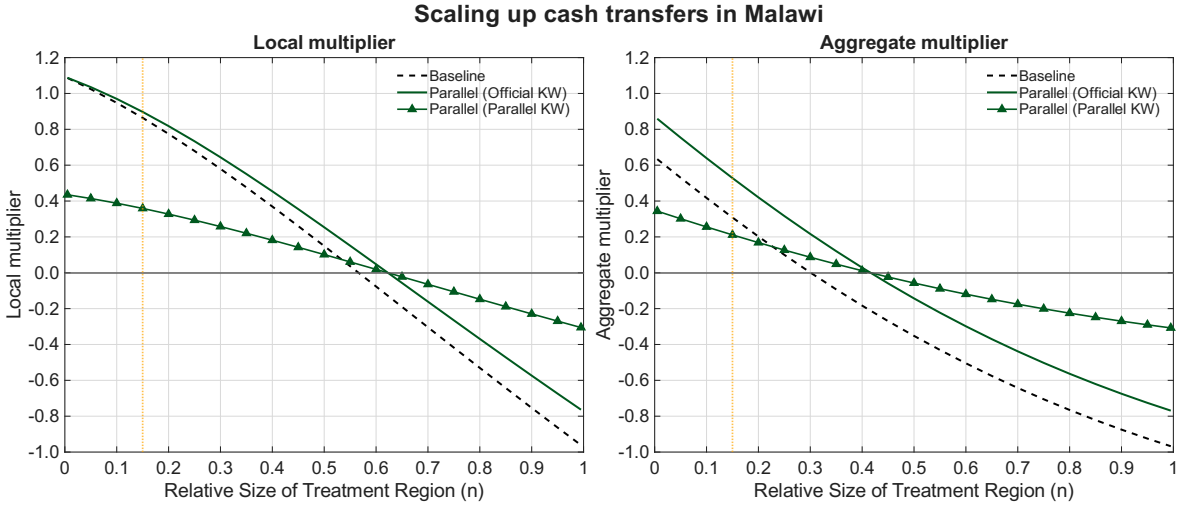
The main takeaway of this counterfactual exercise is that village-level RCT multiplier estimates may be a poor guide to the effects of a scaled-up program as they do not take account of the macro-policy environment.

7.4.3. Results: National GDP Growth

Scaled-up transfers also have a large impact on national GDP growth. In our framework, the effect of transfers on national GDP growth in the first year is simple: the size of the transfers, as a share of national GDP, multiplied by the aggregate multiplier. As the program scales up, transfers as a share of national GDP increase but aggregate multipliers with a closed KA fall, leaving the direction of the impact on growth ambiguous. Quantitatively, Appendix Figure C3 shows that the

[33] While the Malawi-wide HtM share is fixed at 0.63, the HtM share in the treatment and control regions falls by $0.32n$.

Figure 4: Scaling up cash transfers in Malawi: local and aggregate output multipliers



Notes: The figure plots the local (left) and aggregate (right) output multipliers of an one-time cash transfer as a function of the relative size of the treatment region n, for two policy regimes: closed capital account with flexible exchange rate (black) and closed capital account with parallel exchange rate (green). The multiplier where the transfer cost of the transfer is evaluated at the parallel rate is shown in solid lines. As the treatment region scales up, the treated-region hand-to-mouth share ω and the control-region share ω^* vary with n according to the linear rule $\omega(n) = 0.95 - 0.32n$ and $\omega^*(n) = 0.63 - 0.32n$, so that the population-weighted national HtM average is held fixed at the national value of 0.63 for all n (i.e. $n\omega + (1-n)\omega^* = 0.63$). The orange dotted vertical line $n = 0.15$.

impact on GDP growth is inverted-U shaped in program scale. As the treatment region expands to around 0.15-0.2 of the population, the growth impact increases. Afterwards the growth impact falls and becomes negative for very large programs. In our $n = 0.15$ example, the size of the transfer is about 10% of GDP, and so the effect of the cash transfer on GDP growth in percentage points is simply 10 $\times$ the aggregate multiplier. This suggests GDP growth would increase by 3 percentage points for the closed capital account baseline, and 5 percentage points with a parallel rate.

8. Robustness and extensions

8.1. Scaling up cash transfers with an open capital account

Although Malawi has a closed capital account, other countries receiving GD transfers, like Kenya, have open capital accounts. In such cases, scaled up cash transfers can then have a substantially positive impact on GDP growth with an open capital account. Appendix Figure C7 show that as the program scales up, the local multipliers are mostly flat, although the aggregate multipliers fall substantially.[34] As the aggregate multipliers are so large, the impact on output is also

[34]For example by $n = 0.15$, the open-economy aggregate multiplier falls by around 0.15 to 1.87 (fixed-ER) and 1.42 (flex-ER).

rapidly increasing as the program scales up (see Appendix Figure C8). For example, at $n = 0.15$ with a 10% of GDP transfer would generate a growth rate of 14% if the ER was floating or 18.5% if it was fixed (compared with around 4% under a closed KA). This illustrates the importance of the macro-policy regime for determining the effects of scaled-up cash transfers.

8.2. Home bias.

We consider two plausible adjustments to our baseline home-bias estimate. These adjustments move in opposite directions and roughly offset each other, leaving the local multiplier essentially unchanged. This section provides a brief overview of the results; a full description is provided in Appendix A.

First, our baseline assumes full home bias for home-produced food. This simplification may overstate local content, since home production uses agricultural inputs—such as fertilizer and pesticides—that are likely sourced from outside the household's TA. To assess the sensitivity of this assumption, we use the household baseline survey, which records agricultural input expenditures over the previous 12 months. Classifying fertilizer and pesticides as imported, and other inputs (such as seeds and tools) as locally sourced, we estimate that imported inputs account for about 15% of the value of home-produced food.

Second, our baseline defines "home" as the household's own Traditional Authority (TA). By contrast, Egger et al. (2022) define "local" as the entire study area, Siaya County, a much larger geographic unit. To follow this approach, we consider an alternative definition in which "home" is the entire Chiradzulu District, which contains 10 TAs. Under this broader definition, market purchases receive a larger local weight: whereas the baseline TA-level calibration counts only the share of market sellers residing in the household's own TA, the Chiradzulu-as-home definition treats nearly all market sellers as local.[35] This broader regional definition raises home bias from 0.57 to 0.61, with the corresponding local multiplier increasing from 1.09 to 1.25. While closer, this estimate is still around half of the local multiplier from Egger et al. (2022).

8.3. Imported intermediate inputs.

Since a large fraction of imports in Malawi is intermediate inputs used in production—for example, fuel and fertilizers—we extend the model to include imported intermediates in the production

[35] One might expect local content to rise when "home" is expanded from the TA to the full Chiradzulu District. However, due to data limitations, the local-content adjustment already uses Chiradzulu as the relevant boundary, rather than the TA, and does not change under the broader definition of home.

functions of both tradable and non-tradable good sectors. More specifically, the production function for tradable goods is of the following form:

$$Y_t^T(i) = \left[A_t^T L_t^{A,T}(i)^{\alpha_L}\right]^{1-\alpha_M^T} M_t^T(i)^{\alpha_M^T}, \tag{24}$$

where M_t^T denotes imported intermediate input used by firm i in the tradable sector, and α_M^T is related to the share of intermediate in final output. The production function for non-tradable goods is analogous, with share M_t^S and we assume the imported intermediate share of gross output is the same across sectors.[36] We compare the model with imported intermediate inputs with our baseline by changing the parameters α_M^T and α_M^S but reallocating imports from consumption to intermediates to main the same import share.

We find that both aggregate and local multipliers decrease as we increase the share of imported intermediate goods. The reason for this finding is that imported intermediate inputs alter the Phillips curve (the cost channel). Unlike consumption imports, more imported intermediate goods make the Phillips curve steeper. Therefore, transfers lead to more inflation and less output response, reducing multipliers.[37] The main takeaway from this extension is that imported intermediate in production can lower multipliers.

8.4. Dynamics and Cumulative Multipliers.

In this section, we examine the dynamics of the multipliers at longer horizons. Figure 5 plots the dynamic response of the local, spillover, and aggregate GDP multipliers (rows) to the same one-time cash transfer studied in Section 6, under each of the three macro regimes (columns). Within each panel, the dotted line is the per-period impulse response of GDP, scaled to be a dollar-for-dollar multiplier. The solid line is the cumulative multiplier, the sum of per-period responses through year t.[38]

The top row of Figure 5 shows little dynamics: cumulative local multipliers do not depend on the horizon. Across all three regimes, treatment-region GDP rises by about 1.1 dollars in the year of disbursement and returns to baseline the following year, so the cumulative local multiplier is

[36] Value added as gross output Y_t^T net of imported intermediate inputs, valued at steady state prices. We assume the price of imported intermediate goods are the same as imported tradable goods $P_{rw,t}^{T,rw}$.

[37] In addition, there is a composition effect as when we reduce tradable imports for consumption, we need to increase tradable output to replace consumption imports, so the relative size of the tradable sector increases. As non-tradable sector explains larger fraction of multipliers, this change in composition decreases multipliers.

[38] Because the transfer is one-off in the first year, the sum of GDP impacts through year t equals the cumulative multiplier.

equal to the impact multiplier.

For spillover multipliers (middle row) and aggregate multipliers (bottom row), the dynamics are more important. Although an open capital account leads to a *large and positive* spillover multiplier on impact, the effect on GDP of the control region turns negative in later years. Under a closed capital account, spillovers are negative on impact and remain negative at longer horizons. Hence in all three cases, spillover cumulative multipliers fall over time.

The exchange rate regime is an important determinant of the speed of adjustment. With a flexible exchange rate, adjustment is fast and so the impact on GDP in the control region becomes smaller over time and is close to zero by year 5. In contrast, with a fixed exchange rate, the effect on control-region GDP remains substantially negative even at year five.

At moderate horizons, the aggregate cumulative multipliers are much smaller than at impact, and the open-capital-account flexible-ER regime now produces the largest value. By year 5, the open-capital-account flexible-ER cumulative aggregate multiplier is 0.5, above the open-capital-account fixed-ER multiplier of 0.35 — both well below the impact-year multipliers of 1.56 and 2 respectively. The closed-capital-account regime has the lowest cumulative aggregate multiplier at the 5-year horizon (0.16). The intuition for the flipped ranking is that, although a fixed exchange rate produces large multipliers in the short term, it spreads the adjustment over a longer period.

8.5. Price Indexation

In this section, we investigate robustness to the type of price indexation (or lack thereof). In the baseline calibration, we set ω_{bl} to be 80% Gali-Gertler rule-of-thumb indexers, who index to national population-weighted sectoral inflation.[39] We consider two other alternatives. The first alternative has firms index to their own region's past sectoral inflation. The second alternative is the standard Calvo pricing without backward indexation, where 62% of firms are not able to adjust prices each year, but there are no rule-of-thumb indexers.[40]

Appendix Table C1 shows that on-impact local, spillovers and aggregate multipliers are almost completely unaffected by the type of indexation, or whether prices are sticky in a conventional sense (Panel A). However, the 5-year cumulative multiplier can sometimes differ.

Moving from national to local indexation generally results in almost identical 5-year aggregate cumulative multipliers, though with different drivers. For example, in both indexation regimes

[39] This assumption is based on the empirical observation that in high-inflation countries, many firms index to the national CPI, which is more observable than alternative price indices.

[40] 62% is set to approximately match the size of the first year multipliers.

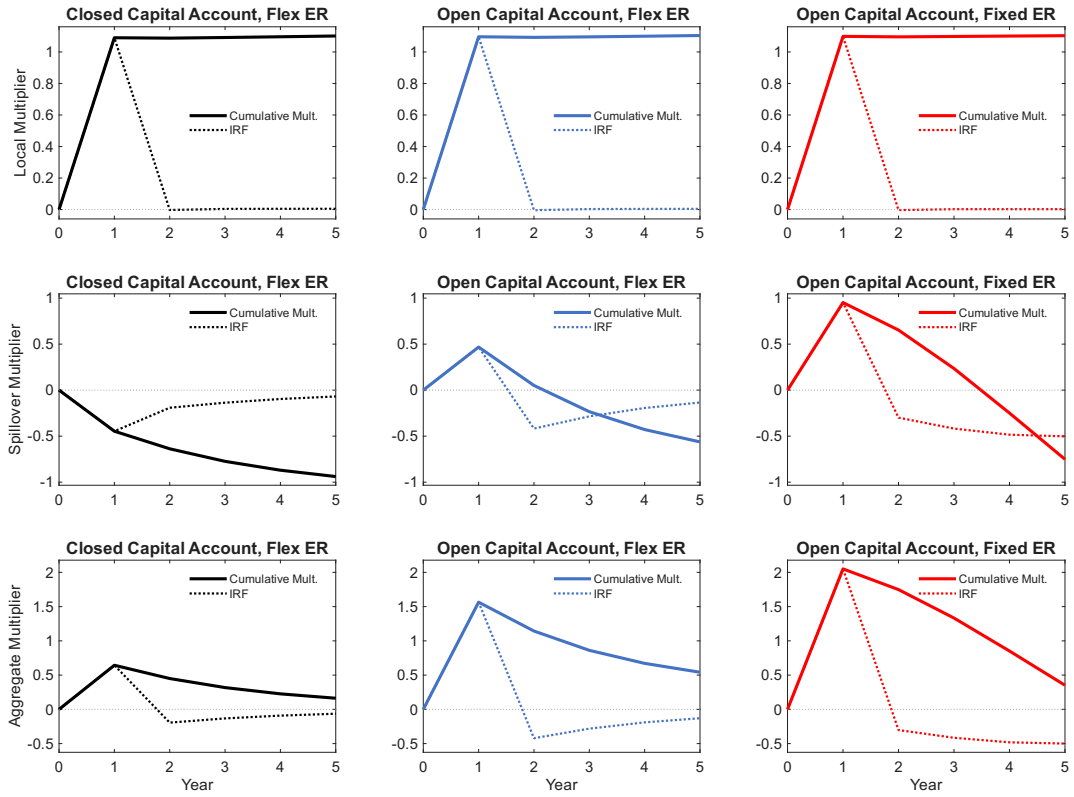


Figure 5: Per-period IRFs and cumulative multipliers by policy regime

Notes: The figure shows the dynamic response of Local, Spillover, and Aggregate GDP multipliers (rows) to a one-time GiveDirectly cash transfer to the treatment region, under three policy regimes (columns): closed capital account with flexible exchange rate (black), open capital account with flexible exchange rate (blue), and open capital account with fixed exchange rate (red). Within each panel, the solid line is the cumulative multiplier and the dotted line is the per-period impulse response of GDP (scaled per dollar of transfers). Multipliers are defined as in Section 6. Time is annual, with $t = 0$ denoting the pre-shock steady state.

the largest multiplier continues to be in the Open KA-Flexible ER case (0.5), with the Open KA-Fixed ER case second (0.3-0.4) and the closed KA case smallest (0.1-0.02). However, the dynamics of how the aggregate multiplier is generated is quite different. Specifically, instead of a falling spillover cumulative multiplier (as in Section 8.4), it is the local cumulative multiplier that falls. The reason is that price indexation distorts future relative prices. In the baseline, future relative prices in the home region are less distorted, because national prices move less than local prices in the first year. However control-region prices are relatively more distorted, because the control region inherits some of the inflation from the transfer in the home region. This means that in the baseline, control region prices are too high for the level of demand, resulting in a negative GDP impact. With local indexation, it is the opposite—local prices continue to rise in the home region, depressing future output, whereas they are closer to steady state in the control region. That is, the local and spillover changes are equal but opposite (Δ Local $\approx$ -Δ Spillover in every regime), because

indexation shifts where the price distortion ends up (home vs control region) without affecting the aggregate response.

If we assume standard Calvo pricing without indexation, most multipliers are similar to the baseline, with the exception of much larger aggregate and spillover cumulative multipliers in the fixed exchange rate regime. Specifically, cumulative local multipliers without indexation after 5 years are fairly similar to the baseline at around 0.9 (vs 1.1 in the baseline). Five-year cumulative spillover and aggregate multipliers are modestly higher than the baseline for closed capital account and open capital account-flexible-Exchange-Rate cases. However, with a fixed exchange rate and open capital account regime, the five-year aggregate cumulative multiplier is 1.8, which is much larger than the 0.4 in the baseline. The reason is not so much that the control-region price level is much higher with national indexation, though this is also true. Rather, the larger price distortions matter more for the output response under the fixed exchange rate regime than under the flexible exchange rate regime.

In sum, while the impact multipliers are always robust, the size and ranking of the medium-run cumulative multipliers can depend on the model specifications. Compared with the baseline, local cumulative multipliers are lower with local indexation, and spillover multipliers are higher, while aggregate multipliers are unchanged. Cumulative aggregate and spillover multipliers are also much higher in the flexible exchange rate and open capital account regime in a standard Calvo model without indexation, due to the absence of persistent inflation that distorts international prices.

9. Conclusion

This paper develops a two-region New Keynesian small open economy model to study the local and aggregate effects of one-time cash transfers in developing countries. We exploit rich microdata from GiveDirectly's ongoing RCT in Malawi to calibrate the model's key parameters. Our model predicts a local GDP multiplier of 1.1 with little first-year inflation. At the national level, the aggregate multiplier depends critically on the macroeconomic policy environment. Taken together, our analysis suggests that cash transfers can substantially boost short-run GDP in sub-national regions receiving them, and in the country as a whole. However, local multiplier estimates are likely not portable across countries or regions if the share of hand-to-mouth households, price rigidities, and home bias in consumption differ. Importantly, external-sector policy becomes increasingly important as programs scale up and have a large effect on aggregate growth impacts of transfers.

We conclude with some ideas for future work which may be relevant for developing countries.

First, it would be interesting to have a model of central bank reserve accumulation, especially in the context of parallel exchange rates (see Berg et al. (2015)). Second, the supply side of the model is fairly stylized, and it would be interesting to see how measures of slack as in Walker et al. (2024) interact with the macro-policy environment.

Disclaimer: The authors used AI-assisted tools (Claude and Codex) to support research activities, including coding some data analysis, developing and debugging code for model extensions, checking model implementation and consistency, generating selected figures, and drafting portions of the appendix. All code, analysis, results, and manuscript content were reviewed and verified by the authors, who take full responsibility for the final work.

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Appendix A. Detailed procedure to calibrated home bias

We estimate TA-level home bias separately for Southern and Northern Chiradzulu, using the Phase I and Phase II household surveys together with the enterprise survey, which is common to both regional estimates. The estimates are strikingly similar: 0.56 in Southern Chiradzulu (Phase I) and 0.58 in Northern Chiradzulu (Phase II), despite large differences in income levels and expenditure composition across the two samples.[41]. We therefore calibrate TA-level home bias to 0.57, the midpoint of the two estimates. This appendix is organized as follows. Subsection A.I defines the home-bias measure. A.II presents the estimates for each region. A.III provides additional details on the data and construction of the estimates. A.IV discusses two robustness extensions.

I. Definitions

Home bias is computed at the household level. For household i, home bias is defined as the fraction of total expenditure that generates income within the household's Traditional Authority (TA). It is computed as:

$$HB_i = \sum_s \sum_\ell \lambda^i_{s,\ell}, LC_{s,\ell}, \tag{A.1}$$

where s indexes sectors, ℓ indexes spending locations, and $\lambda^i_{s,\ell}$ is the share of household i's total expenditure in sector s at location ℓ. The term $LC_{s,\ell}$ denotes the local content of spending in sector s at location ℓ, defined as:

$$LC_{s,\ell} = \pi_{s,\ell} \left(1 - \gamma^F_s\right). \tag{A.2}$$

here, $\pi_{s,\ell}$ is the *residency share*: the probability that a seller in sector s at location ℓ resides within the household's TA. The parameter γ^F_s is the imported intermediate input share in revenues in

[41] A key difference across the two surveys is the recall period used to measure food consumption. In Phase I, households were asked to report food expenditures over the last 30 days. In Phase II, the food recall period was shortened to 7 days, while non-food and services retained the 30-day recall period. The shorter food recall period is likely to capture food spending more accurately, since households tend to underreport frequent, small purchases when asked to recall them over a longer period. After scaling food expenditures to a common 30-day basis, the food expenditure share rises from 51% in Phase I to 74% in Phase II, while the services share falls from 30% to 16%. Despite this large compositional shift, the overall home-bias estimate barely moves. The reason is that the increase in food spending, which has high local content through home production, roughly offsets the decline in services spending, which also has high local content. Note that Phase I estimate may understate home bias in poorer Southern Chiradzulu, because the 30-day food recall period likely underreports food consumption, a relatively local component of household spending

sector s. Hence, $1 - \gamma_s^F$ is the *local revenue share*: the average fraction of sector-s revenue that accrues locally through labor income, profits, or TA-sourced inputs.

The aggregate (district-level) home bias is the expenditure-weighted average of household-level home bias:[42]

$$HB = \sum_i \omega_i \frac{EXP_i}{\overline{EXP}} HB_i, \tag{A.3}$$

where ω_i is the normalized household survey weight, EXP_i is total household expenditure, and $\overline{EXP}$ is average household expenditure computed using survey weights. Hence, $\omega_i EXP_i/\overline{EXP}$ is household i's share in total weighted expenditure.

Given that $LC_{s,\ell}$ does not vary across households, the aggregate home bias can be written equivalently as a sector-location decomposition[43]:

$$HB = \sum_s \sum_\ell \Lambda_{s,\ell} \pi_{s,\ell} \left(1 - \gamma_s^F\right), \tag{A.4}$$

where $\Lambda_{s,\ell}$ is the aggregate household expenditure share in sector s at location ℓ. This decomposition is useful to understand what is important or not for the home bias, as in Table **??** bellow.

II. Results

Table A1 reports the home-bias estimates separately for Southern Chiradzulu (Phase I) and Northern Chiradzulu (Phase II). For both regions, we estimate TA-level home bias using the corresponding household survey together with the enterprise survey, which provides the residency shares and local revenue shares used in both calculations.

The estimates are remarkably similar across the two regions. TA-level home bias is 0.56 in Southern Chiradzulu and 0.58 in Northern Chiradzulu. We therefore use the midpoint, 0.57, as our baseline calibration. Interpreted literally, this means that about 57 cents of each kwacha of household expenditure generates income within the household's own TA.

The similarity of the estimates is notable given the large differences between the two samples. Northern Chiradzulu is substantially richer than Southern Chiradzulu, with annual per capita income and expenditure roughly three times higher. Expenditure composition also differs sharply

[42] The survey weights make the estimates representative of Chiradzulu district. The household sampling weight is the inverse of the household sampling probability within each village. It is computed as the ratio of the total number of households in the village, from the census, to the number of households sampled in that village at baseline.

[43] A proof is available upon request

across phases. In Phase II, food accounts for 74% of total spending, including 28% from home production, while non-food and services account for only 11% and 16%, respectively. In Phase I, spending is more balanced: food accounts for 53%, non-food for 18%, and services for 29%.

Despite these differences, overall home bias barely changes. The reason is that the main compositional shifts offset each other. In Northern Chiradzulu, the larger food share raises home bias because food has high local content, especially through home production. At the same time, the services share is lower, and services also have high local content. As a result, the increase in food spending roughly offsets the decline in services spending.

Several features of the decomposition are worth highlighting. First, home production is an important contributor to home bias, especially in Northern Chiradzulu, where it accounts for 28% of total expenditure. Home production enters with full local content, since $\pi = 1$ and $1 - \gamma^F = 1$. Second, most purchased spending occurs at the village level or in same-TA markets, while direct expenditure leakages to Blantyre or outside Chiradzulu are relatively small. Third, local revenue shares vary substantially across sectors: about half of food and non-food revenues are absorbed by imported intermediate inputs, while services retain a larger share locally.

III. Data Details

Three parts of the calculation rely on assumptions that are worth discussing.

Expenditure shares ($\Lambda_{s,\ell}$). For each expenditure item, the household survey records the amount spent and the purchase location. The expenditure share $\Lambda_{s,\ell}$ is the share of total spending allocated to sector s at location ℓ, aggregated across households using expenditure $\times$ survey weight.[44]

Local revenue share ($1 - \gamma^{F,s}$). Enterprise revenue is decomposed into labor, profit, and input costs, normalized to sum to one at the enterprise level, then aggregated using revenue $\times$ survey weight. The key challenge is splitting input costs into locally sourced (γ^H) and imported (γ^F). The enterprise survey asks each firm whether it sources inputs from each of seven locations (four local, three outside Chiradzulu), but it records only *whether* each source is used—not *how*

[44] Household expenditure is classified into three sectors. *Food* includes 14 aggregate categories (maize, other cereals, grinding, tubers/roots, legumes/nuts, vegetables, dairy, fish, meat, sugar/oils, fruits, non-alcoholic drinks, alcohol/tobacco, and miscellaneous), covering both purchases and home production (own-produced food and gifts). *Non-food* includes durable and semi-durable goods (clothing, household items, fuel, construction materials, electronics, carpets, furniture, household equipment, and vehicles). *Services* includes prepared food vendors, repairs, entertainment, personal items, medical expenses, phone/airtime, transport, electricity, water, rent, school fees, insurance, mail, lottery, wages paid, religious contributions, charity, weddings/funerrals, taxes, bribes, and public goods contributions.

Table A1: **Home bias by location and sector: share per kwacha of total consumption**

π and $1-\gamma^F$ are estimated from the enterprise survey and are common across regions.

	Food				**Non-food**				**Services**			
Location	Λ	π	$1-\gamma^F$	HB	Λ	π	$1-\gamma^F$	HB	Λ	π	$1-\gamma^F$	HB
Panel A: Southern Chiradzulu (Phase I, 3,275 HHs)												
Home production	.19	1	1	.19	—	—	—	—	—	—	—	—
Own village	.14	1	.48	.07	.08	1	.50	.04	.22	1	.76	.17
Other village	.03	1	.48	.01	.01	1	.50	.00	.01	1	.76	.01
Market, same TA	.10	.99	.48	.05	.04	.55	.50	.01	.02	.87	.76	.01
Market, different TA	.02	0	—	—	.01	0	—	—	.00	0	—	—
Blantyre	.02	0	—	—	.03	0	—	—	.01	0	—	—
Outside Chiradzulu	.03	0	—	—	.03	0	—	—	.03	0	—	—
Sum	**.53**			**.32**	**.18**			**.05**	**.29**			**.19**
Total home bias (South)												**.56**
Panel B: Northern Chiradzulu (Phase II, 5,633 HHs)												
Home production	.28	1	1	.28	—	—	—	—	—	—	—	—
Own village	.14	1	.48	.07	.02	1	.50	.01	.11	1	.76	.09
Other village	.04	1	.48	.02	.01	1	.50	.00	.00	1	.76	.00
Market, same TA	.20	.99	.48	.09	.03	.55	.50	.01	.02	.87	.76	.01
Market, different TA	.06	0	—	—	.02	0	—	—	.00	0	—	—
Blantyre	.02	0	—	—	.02	0	—	—	.00	0	—	—
Outside Chiradzulu	.01	0	—	—	.02	0	—	—	.02	0	—	—
Sum	**.74**			**.46**	**.11**			**.02**	**.16**			**.10**
Total home bias (North)												**.58**
Baseline calibration (midpoint)												**.57**

Notes. HB $= \Lambda \times \pi \times (1-\gamma^F)$. Λ is the expenditure share, π is the residency share (probability seller resides in household's TA), and $1-\gamma^F$ is the local revenue share. Dashes indicate zero HB contribution ($\pi = 0$). Phase I uses 30-day recall for all items. Phase II uses 7-day food recall (scaled $\times 30/7$) and 30-day recall for non-food and services.

much is purchased from each. We therefore classify each enterprise into one of three types: (i) firms reporting only local sources are assigned $\gamma^F = 0$ (all inputs local); (ii) firms reporting only outside sources are assigned $\gamma^F = \gamma$ (all inputs imported); (iii) firms reporting both local and outside sources are assigned $\gamma^H = \gamma^F = \gamma/2$ (equal split). This equal-split rule is ad hoc, but it affects only 10% of enterprises; the remaining 90% source exclusively from one type, so the aggregate $1 - \gamma^F$ is not sensitive to this assumption. Home production receives $(1 - \gamma^F) = 1$, but we provide a robustness to that assumption in the appendix.

Missing location treatment. For food and non-food goods, items with missing purchase location are redistributed proportionally across the household's observed purchase locations within that sector. For services, 18 of 24 expenditure items (including school fees, rent, water, electricity, transport, and religious contributions) have no location variable in the survey instrument; these are assigned to 'own village" ($\pi = 1$) as they are predominantly local services. The exception is phone and airtime expenditure, which is assigned to 'outside Chiradzulu" ($\pi = 0$) as it accrues to telecom companies. Dashes indicate zero HB contribution ($\pi = 0$).

Residency shares for market purchases. When a household purchases at a market in its own TA, the seller may or may not reside in that TA. We need to determine what fraction of market spending goes to TA residents. We estimate this using the enterprise baseline survey, which records both the market where each enterprise operates and the TA where its owner resides. The residency share is the revenue-weighted fraction of sellers at same-TA markets whose owners live in the TA. Revenue weighting captures the probability that a dollar of spending goes to a TA-resident seller.

IV. Extensions and Robustness

Alternative Geographic Definition: Chiradzulu District as Home. The baseline calibration defines 'home" as the household's own Traditional Authority (TA). By contrast, Egger et al. (2022) define 'local" as the entire study area, Siaya County, which is a much larger geographic unit. Following that approach, we also consider an alternative definition in which "home" is the entire Chiradzulu District, which contains 10 TAs. Under this broader definition, the only parameter that changes is the residency share, π. In the baseline TA-level calibration, purchases at markets in a different TA receive $\pi = 0$, since the seller is assumed to reside outside the household's own TA. Under the Chiradzulu-as-home definition, these purchases receive $\pi = 1$, because the enterprise survey finds that only 11 of 1,288 enterprise owners are from outside the district. Same-TA market purchases also receive $\pi = 1$. This adjustment matters most for non-food goods, where the baseline

same-TA residency share is only $\pi = 0.55$.

One might also expect the imported-intermediate share, γ_s^F, to fall under a broader definition of "home," since inputs sourced from other TAs within Chiradzulu would now count as local. However, due to the survey design, γ_s^F is already computed at the Chiradzulu-district level.[45] Therefore, moving from a TA-level to a district-level definition of home affects π, but not γ_s^F.

Results – In Southern Chiradzulu, the increase in home bias is modest. Only about 20 percent of household spending occurs at markets, and an even smaller share occurs at markets outside the household's TA, which are the purchases that receive the largest increase in residency shares. The total increase is approximately +0.03, raising home bias from 0.56 at the TA level to 0.59 at the Chiradzulu-district level.[46] In Northern Chiradzulu, the increase is larger because different-TA market food spending accounts for a larger share of total expenditure ($\Lambda = 0.06$). This component alone adds approximately $.06 \times .48 = +0.03$. Together with different-TA non-food purchases ($.02 \times .50 = +0.010$) and the same-TA non-food adjustment ($.03 \times 0.45 \times .50 = +0.007$), the total increase is approximately +0.05, raising home bias from 0.58 at the TA level to 0.63 at the Chiradzulu-district level. The midpoint of the two Chiradzulu-district estimates is therefore approximately 0.61.

Imported Intermediates in Home Production. The baseline assigns $(1-\gamma^F) = 1$ to home-produced food, treating all home production value as local. This is optimistic, since farming uses some imported inputs—particularly fertilizer and pesticides—that are likely sourced from outside Chiradzulu. To assess the sensitivity of this assumption, we use the household baseline survey, which records agricultural input expenditures over the previous 12 months. Classifying fertilizer and pesticides as imported, and seeds, tools, and other inputs as locally sourced, we estimate the imported input share as the ratio of aggregate imported input spending to aggregate home-produced food value, using survey weights.

The imported share differs across survey phases. In Southern Chiradzulu, imported inputs (fertilizer and pesticides) account for 20% of home-produced food value, implying $(1-\gamma^F_{\text{home}}) = 0.80$.

[45] The enterprise survey asks each firm whether it sources inputs from seven locations: four within Chiradzulu (own village, same-TA market, other Chiradzulu village, different-TA market) and three outside Chiradzulu (Blantyre, outside Chiradzulu, and outside Malawi). We assign $\gamma_s^F = 0$ to the four within-Chiradzulu sources and $\gamma_s^F > 0$ only to the three outside sources.

[46] The increase comes from two sources. First, different-TA market purchases, previously assigned $\pi = 0$, now contribute $\Lambda \times 1 \times (1-\gamma_s^F)$: food contributes $.02 \times .48 = +.010$, and non-food contributes $.01 \times .50 = +.005$. Second, same-TA non-food market purchases see π rise from 0.55 to 1, adding $.04 \times 0.45 \times .50 = +.009$. The total increase is approximately +0.03.

In Northern Chiradzulu, the imported share is only 10%, implying $(1 - \gamma^F_{\text{home}}) = 0.90$.[47] Under these adjustments, home bias falls from 0.56 to 0.52 (-0.04) in Southern Chiradzulu, and from 0.58 to 0.55 (-0.03) in Northern Chiradzulu. The midpoint of the adjusted estimates is approximately 0.54, about 3 cents below baseline.

Appendix B. Financial stress calibration details

As in Sergeyev et al. (2024), we calibrate the "steady-state" stress level $\bar{D}^N$ and the decay rate ϕ^N_D using survey data. In particular, we use the Phase II household baseline survey from Northern Chiradzulu District ($\approx$ 1,500 observations from a pratial release of the data as of Mach 29, 2026), which includes questions designed to identify both qualitative and quantitative measures of financial stress, as well as how stress varies with cash-in-hand, measured here more broadly as emergency funds, including not only cash but also other available sources such as family help. Our survey contains three key questions:

1. *How worried are you about your financial situation?* (1–5 scale, from "Not worried" to "Extremely worried") — a qualitative measure of financial stress.

2. *How many hours during a typical work day are you distracted by financial problems?* — a quantitative measure of stress, expressed as working hours lost to financial concerns.

3. *How much money could you raise within a week in case of an emergency?* — a measure of cash-in-hand, capturing the household's financial condition.

Panel A of Figure A1 reports the amount of money households could raise within one week in case of an emergency as a share of annual household consumption expenditure. We group respondents into three financial stress categories based on their self-reported worry level: not worried (score 1), moderate (scores 2–4), and extremely worried (score 5). We also report an "All" group pooling the full sample.[48] As expected, the qualitative stress groups correlate negatively with emergency funds: moderately worried households have enough funds to get through one and

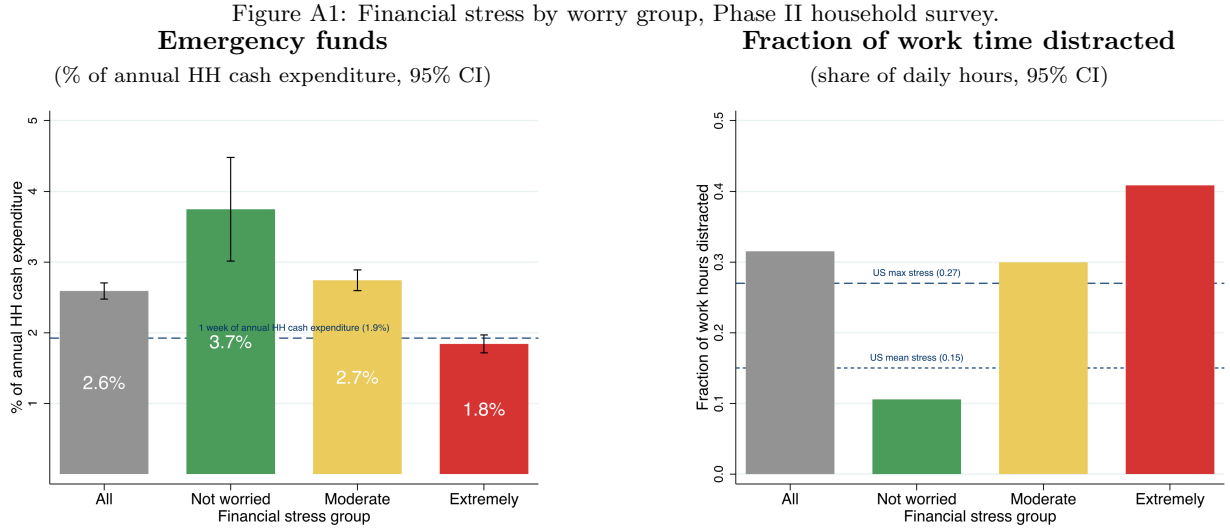
[47] The lower share in Phase II likely reflects the 7-day food recall, which captures substantially higher home production values than the 30-day recall (Phase I), inflating the denominator relative to the 12-month agricultural input costs in the numerator. Mean annual home-produced food: MWK 208,000 (Phase I) vs. MWK 910,000 (Phase II), while mean imported inputs: MWK 42,000 vs. MWK 91,000.

[48] For each group, we compute the sample mean of emergency funds as a percentage of annual consumption. The sample is restricted to respondents with non-missing worry level and emergency fund amount.

a half weeks, not worried households about two weeks, and extremely worried households only one week. The differences in funds across stress groups are small though statistically significant.

Panel B of Figure A1 reports the share of daily working hours lost to financial distraction for each stress group. The main fact is that both the full sample and the moderately stressed group lose about 30% of their working time to financial distraction. We use this fact to calibrate $\bar{D}^N$. This is remarkably similar to the 27% stress reported for financially constrained households in the United States in Sergeyev et al. (2024). Panel B also shows that small changes in the availability of emergency funds across stress groups are associated with large changes in financial stress: households that are not worried, with roughly 1 percentage point more emergency funds relative to the moderate group, spend only 10% of their time distracted, while extremely worried households, with roughly 1 percentage point less emergency funds relative to the moderate group, spend 40% of their time distracted.

Figure A1: Financial stress by worry group, Phase II household survey.



Calibration. There are three parameters to calibrate: the "steady-state stress" level $\bar{D}^N$, the exponential stress decay rate ϕ_D, and the size of the transfer relative to annual household consumption, NTR_t^N/C_{ss}^N. We calibrate $\bar{D}^N$ so that households spend 30% of their time distracted in steady state:

$$\bar{D}^N = \frac{0.3 \times L_{ss}^N}{1 - 0.3}.$$

We calibrate NTR_t^N/C_{ss}^N to one, since the average transfer to households ($1,050 = 2 adults $\times$ $550 per adult) is roughly equivalent to one year of household consumption expenditure (about $1,000 from the Phase I household survey).

Finally, we set $\phi_D = 1$. This implies that financial stress collapses to zero during the *entire* year of the GD transfer. This calibration is motivated by the large decline in stress observed in the survey cross section even for much smaller variation in funds availability, from 2–4% of annual consumption, relative to the much larger increase in cash-in-hand generated by the transfer, equal to 100% of annual consumption.

Appendix C. Additional Figures and Tables

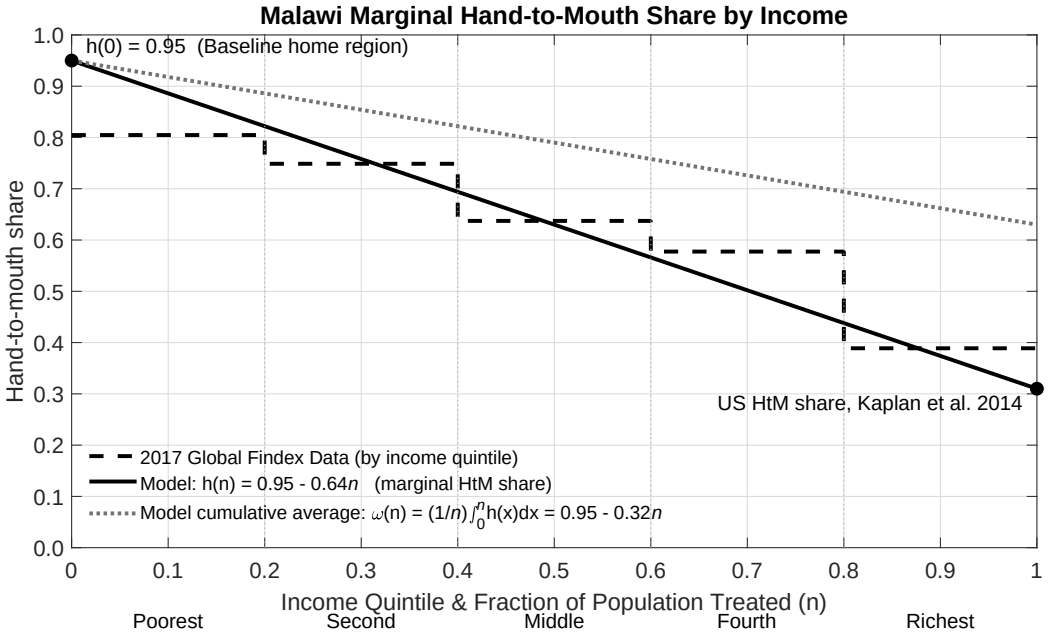


Figure C1: Marginal Hand-to-Mouth share by income in Malawi. Step function: 2017 Global Findex data by income quintile. Solid line: linear marginal density $h(n) = 0.95 - 0.64\,n$ used in the model. Dotted line: implied cumulative average $\omega(n) = (1/n)\int_0^n h(x)\,dx = 0.95 - 0.32\,n$.

Table C1: Multipliers under alternative indexation assumptions

		A. Impact Multiplier (1st year)			B. 5yr Cumulative Multipliers		
Scenario	**Type**	**Default (National)**	**Local Indexation**	**None* (Calvo)**	**Default (National)**	**Local Indexation**	**None* (Calvo)**
Closed KA, Flexible ER	Local	1.1	1.1	1.1	1.1	0.1	0.9
Closed KA, Flexible ER	Spillover	-0.4	-0.4	-0.5	-0.9	0.0	-0.7
Closed KA, Flexible ER	**Aggregate**	**0.6**	**0.7**	**0.6**	**0.2**	**0.1**	**0.3**
Open KA, Flexible ER	Local	1.1	1.1	1.1	1.1	0.1	0.9
Open KA, Flexible ER	Spillover	0.5	0.5	0.4	-0.6	0.4	-0.2
Open KA, Flexible ER	**Aggregate**	**1.6**	**1.6**	**1.5**	**0.5**	**0.5**	**0.7**
Open KA, Fixed ER	Local	1.1	1.1	1.1	1.1	0.1	0.9
Open KA, Fixed ER	Spillover	1.0	1.0	1.0	-0.8	0.2	0.9
Open KA, Fixed ER	**Aggregate**	**2.1**	**2.1**	**2.1**	**0.4**	**0.3**	**1.8**

Note: *Annual price stickiness Calvo parameter = 0.62 with no indexation.

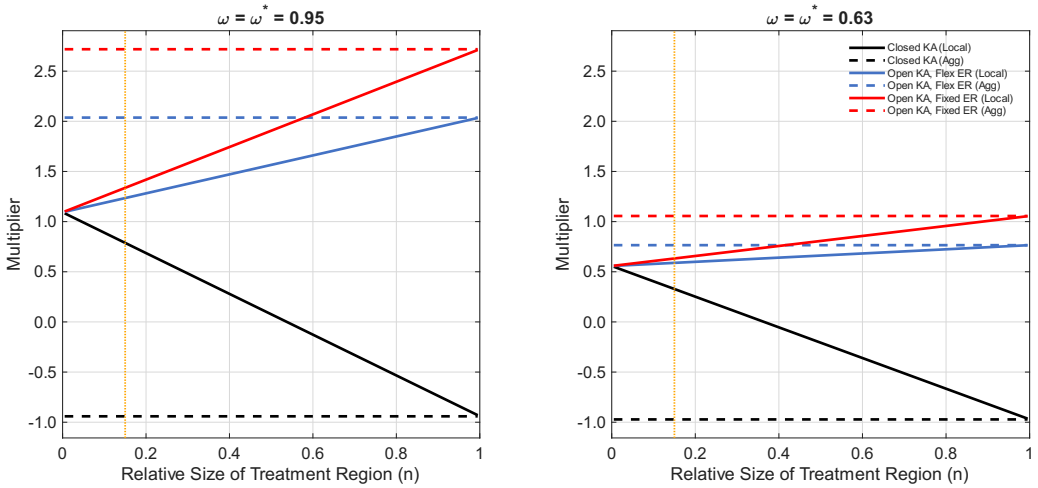


Figure C2: Local and aggregate output multipliers as the treatment region scales up, under symmetric hand-to-mouth (HtM) shares ($\omega = \omega^*$)

Notes: Each panel plots the local (solid) and aggregate (dashed) output multipliers of cash transfers, as a function of the relative size of the treatment region n, for three policy regimes: closed capital account with flexible exchange rate (black), open capital account with flexible exchange rate (blue), and open capital account with fixed exchange rate (red). The left panel sets the HtM share in both the treated and control regions to $\omega = \omega^* = 0.95$; the right panel sets both to the national average $\omega = \omega^* = 0.63$. The orange dotted vertical line marks the hypothetical treatment share $n = 0.15$.

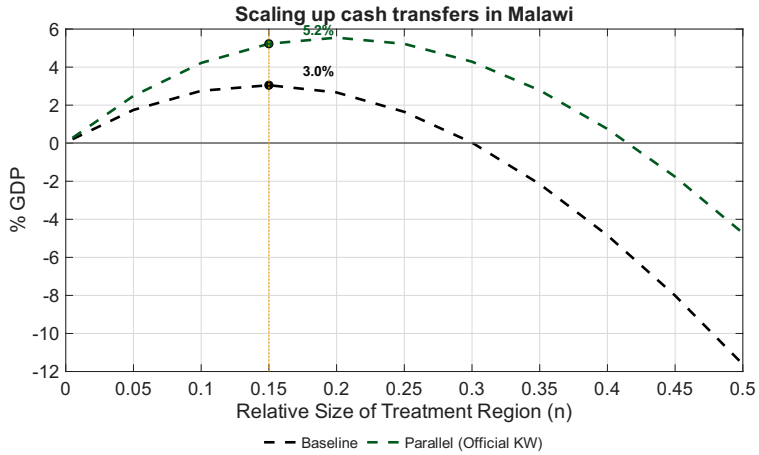
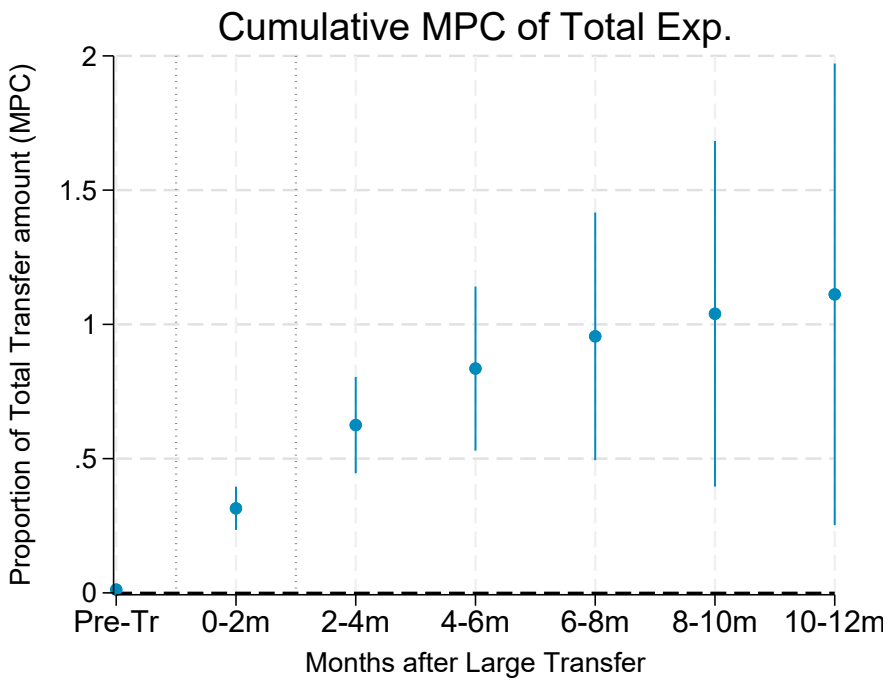


Figure C3: Scaling up cash transfers in terms of national GDP growth

Notes: We compute the percentage change in Malawi GDP as the sizes of the cash transfers program goes up. The orange dotted vertical line marks the hypothetical treatment share $n = 0.15$.



Source: Reproduced from Egger et al. 2026. Sample: Khongoni TA Oct 2023-Feb 2025.
Notes: 95% CI shown. Pre-Tr is after the USD 50 tr but before the USD 416 large transfer.
Randomization: staggered rollout by GVH. Control dummies: GVH, month, field officer.

Figure C4: MPC to spend one-time transfers in Khongoni subdistrict from Egger et al. (2025)

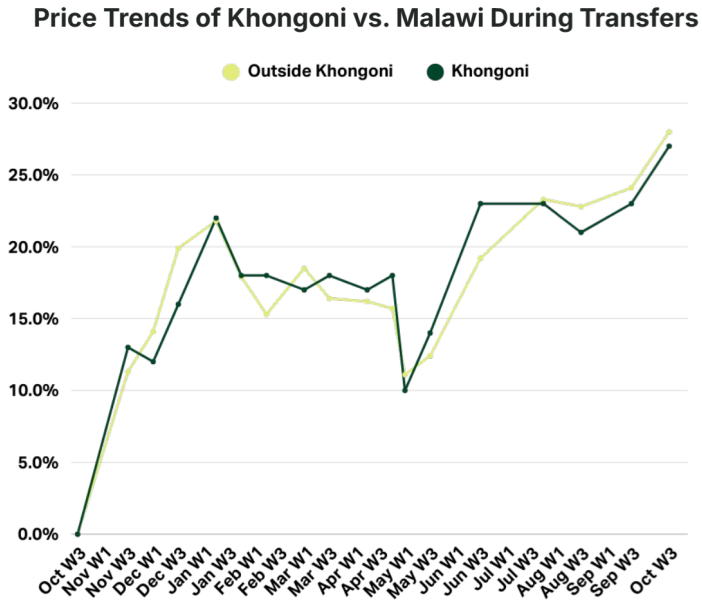


Figure C5: Price trends in response to one-time transfers in Khongoni subdistrict from Egger et al. (2025)

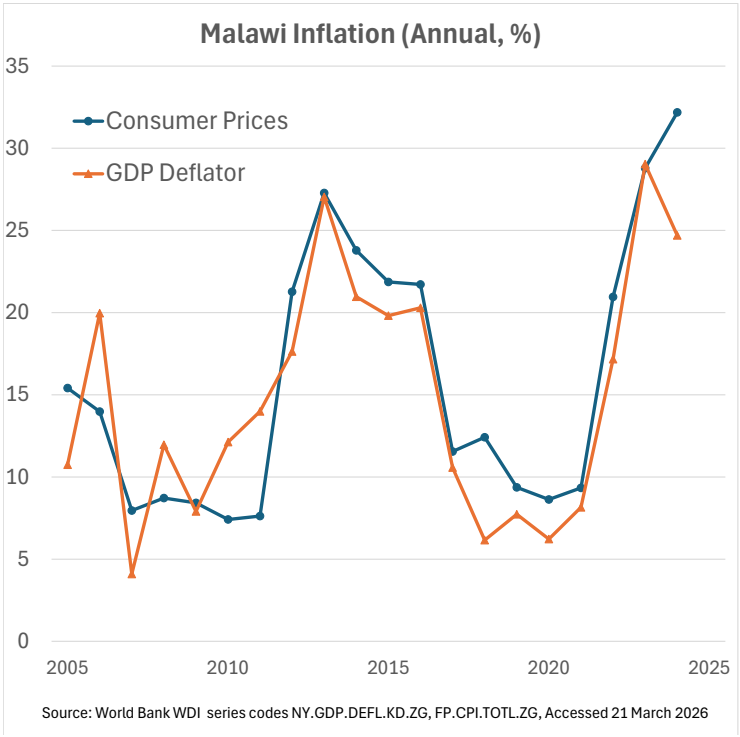
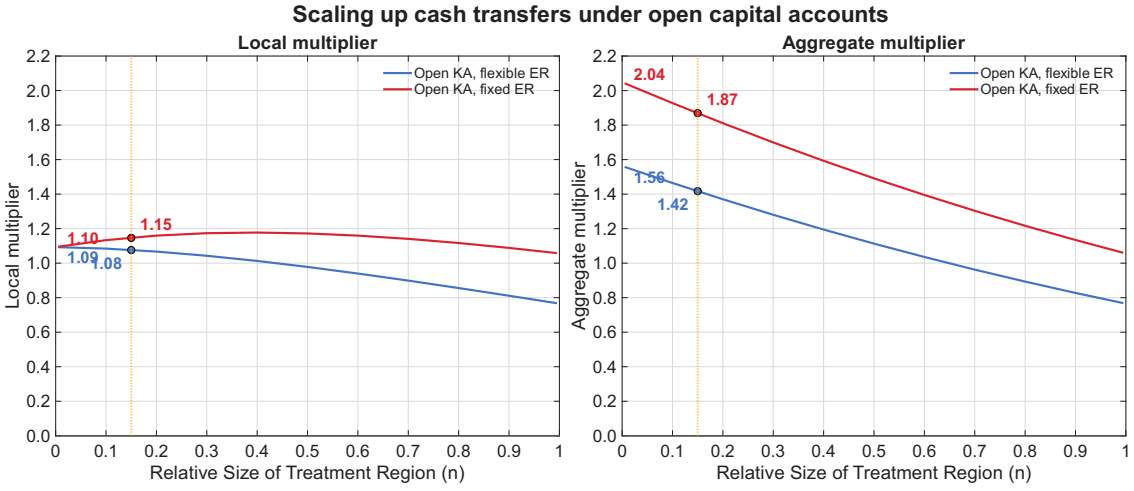


Figure C6: Inflation in Malawi

Figure C7: Scaling up cash transfers with an open an open capital account: local and aggregate output multipliers



Notes: The figure plots the local (left) and aggregate (right) output multipliers of an unconditional cash transfer as a function of the relative size of the treatment region n, for two policy regimes in the open economy: a fixed ER (red) and a floating exchange rate (blue). As the treatment region scales up, the treated-region hand-to-mouth share ω and the control-region share ω^* vary with n according to the linear rule $\omega(n) = 0.95 - 0.32n$ and $\omega^*(n) = 0.63 - 0.32n$, so that the population-weighted national HtM average is held fixed at the national value of 0.63 for all n (i.e. $n\omega + (1-n)\omega^* = 0.63$). The orange dotted vertical line $n = 0.15$.

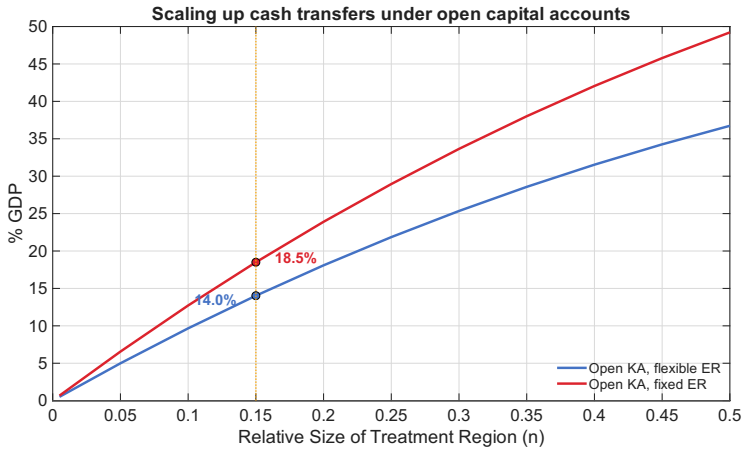


Figure C8: Scaling up cash transfers in terms of national GDP growth - Open economy

Notes: We compute the percentage change in Malawi GDP as the sizes of the cash transfers program goes up. The orange dotted vertical line marks the hypothetical treatment share $n = 0.15$.

Appendix D. Propositions

Assumptions

Common assumptions. :

A1. *No services*

A2. *Small treatment region*: $n \to 0$,

A5. *No indexation*: $\chi^{bl,T} = \omega^{bl,T} = 0$.

A7. *Separable preferences*

A8. *One-time transfer*

Specific to Propositions 1a, 1b. (rigid prices and wages, with HtM):

A3. *Rigid prices*: $\theta_P^T \to 1$

A4. *Rigid wages*: $\theta_W \to 1$, so $\widehat{W}_t = 0$.

A6. *Common labor allocation* (labor-union convention): $\widehat{L}_t^R = \widehat{LN}_t^d$ for all t.

Specific to Proposition 2. (flexible prices and wages, no HtM):

A3′. *Flexible prices*: $\theta_P^T \to 0$ all t.

A4′. *Flexible wages*

A9. *No hand-to-mouth households*: $\omega = \omega^* = 0$. All households are Ricardian.

A10. *Closed capital account*: $\phi_R^{rw} \to -\infty$, pinning $\widehat{B}_{rw,t} \approx 0$ for all t

Statements

Proposition 1 (Rigid P, with HtM, general β). *Under Assumptions A1, A2, A3, A4, A5, A6, A7, A8 and $\beta R^*_{ss} = 1$, the impact local multiplier of a one-time cash transfer of magnitude τ is*

$$\frac{\mathrm{d}\widehat{Y}_0}{\mathrm{d}\tau} = \frac{\alpha_h^T \left[(1-\beta) + \omega\,(\beta - \alpha_h^T)\right]}{(1-\alpha_h^T)(1-\alpha_h^T\,\omega)}. \tag{D.1}$$

Additionally if $\beta \to 1$, the impact local multiplier simplifies to

$$\left.\frac{\mathrm{d}\widehat{Y}_0}{\mathrm{d}\tau}\right|_{\beta\to 1} = \frac{\omega\,\alpha_h^T}{1-\alpha_h^T\,\omega}. \tag{D.2}$$

Proposition 2 (Flex P/W, no HtM). *Under Assumptions A1, A2, A3′, A4′, A5, A7, A8, A9, A10 and $\beta R^*_{ss} = 1$, the impact local multiplier of a one-time cash transfer of magnitude τ is*

$$\frac{\mathrm{d}\widehat{Y}_0}{\mathrm{d}\tau} = -\frac{\alpha_L\,(1-\beta)}{1+\psi}. \tag{D.3}$$

Proofs are available upon request and a similar to those in Pennings (2021), but flavor is given here:

- For Proposition 1, the key is that with fixed prices $\widehat{Y}_t^T = \alpha_h^T\,\widehat{C}_t$, with $\widehat{C}_t \equiv (1-\omega)\,\widehat{CR}_t + \omega\,\widehat{CN}_t$. where $\widehat{CR}_t$ is constant.
- For Proposition 2 the proof focuses on the supply side in terms of determinants of labor supply using the fact is that Ricardian consumption is constant.

Appendix E. Fiscal Dominance Extension

This appendix adds a simple fiscal-dominance extension based on Leeper (1991) to investigate how it affects the GiveDirectly transfer multiplier. Throughout we assume (i) a closed capital account, so there is no foreign borrowing/lending (only domestic debt denominate in Kwacha) (ii) a flexible exchange rate (without a parallel premium). Being the richer households, only Ricardian households hold government debt and pay the lump-sum taxes used to service it.

Model. Let B_t^G denote nominal end of period government debt issued during period t and outstanding at the end of the period. It is purchased for $B_t^G/R_t^\star$, where $R_t^\star$ is the gross policy rate. The stock B_{t-1}^G is inherited beginning-of-period debt brought from the end of $t-1$ into period t. The government levies lump sum taxes $T_t^{G,R}$ to pay for the debt. Therefore the treatment region Ricardian household's budget constraint, Equation 2 in then main text becomes:[49]

$$P_t C_t^R + \frac{B_t}{R_t^*} + \frac{B_t^G}{R_t^\star} + T_t^{G,R} = B_{t-1} + B_{t-1}^G + W_t^L L_t^R + NTR_t^R + \Pi_t^R \tag{E.1}$$

Aggregate per capita debt is just a population weighted average (also adjusting for the fact the HtM HHs don't hold any debt): $B_{agg,t}^G = n(1-\omega)B_t^G + (1-n)(1-\omega^\star)B_t^{\star G}$.[50]. The aggregate government real budget constraint, using end-of-period debt is as follows where lower-case debt and taxes are real quantities measured as shares of steady-state GDP. We assume no government spending, just accrued debt. Thus inherited debt is revalued by aggregate inflation, while new borrowing is discounted by the current policy rate.

$$\frac{b_{agg,t}^G}{R_t^\star} + \tau_{agg,t}^G = \frac{b_{agg,t-1}^G}{\Pi_t^{agg}}. \tag{E.2}$$

The baseline fiscal rule adjusts current taxes to inherited debt, where key parameter here is γ_b which determines whether fiscal policy is passive (large γ_b) or active (small γ_b). :

$$\tau_{agg,t}^G - \tau_{agg,ss}^G = \gamma_b \left(b_{agg,t-1}^G - b_{agg,ss}^G \right). \tag{E.3}$$

Monetary policy follows a Taylor rule as in Equation 16 in the main text, but allowing for a small value of ϕ_π in a passive monetary regime

[49] This expression excludes the external borrowing in Equation 2 that are not active here. The control region budget constraint is analogous.

[50] Steady state per capita debt the same across treatment and control households $B_{ss}^G = B_{ss}^{\star G}$

Calibration and policy regimes. The calibration is the same as that in the baseline closed-KA case in the main text.[51] The steady-state debt calibration follows the 2025 IMF Article IV for Malawi, which reports total public debt of about 80 percent of GDP, comprising approximately 50 percent domestic and 30 percent external debt.[52] Because the model does not include foreign-currency government debt (which is mostly concessionary anyway), local-currency debt is calibrated to the domestic component of 50% GDP, with taxes levied to services it equally 2% of GDP (as $\beta = 0.96$):

Following Leeper (1991), the three policy specifications are:

- **Smoothed AM/PF:** active monetary/passive fiscal policy with $\rho_R = 0.8$, $\phi_\pi = 1.5$, $\phi_Y = 0.5$, and debt-stabilizing taxes $\gamma_b = 0.1$.
- **Simple AM/PF:** the same active monetary/passive fiscal assignment, but with an unsmoothed inflation-only Taylor rule: $\rho_R = 0$, $\phi_\pi = 1.5$, $\phi_Y = 0$, and $\gamma_b = 0.1$.
- **PM/AF:** passive monetary/active fiscal policy with $\rho_R = 0$, $\phi_\pi = 0.5$, $\phi_Y = 0$, and no debt-stabilizing tax response, $\gamma_b = 0$.

Looping over the policy variables replicate the policy assignments similar to Leeper (1991):[53]

- **Simple AM/PF:** the model is determinate for $\phi_\pi \geq 1.1$ and $\gamma_b \geq 0.04$ on the grids considered. Lower ϕ_π produces indeterminacy, while lower γ_b produces no stable equilibrium.
- **PM/AF:** the model is determinate for $\phi_\pi \leq 1.0$ and $\gamma_b \leq 0.03$. Raising ϕ_π above one produces no stable equilibrium, while stronger fiscal feedback produces indeterminacy.

Conditional on determinacy, fiscal dominance has only a modest effect on the impact multiplier (Appendix Table C2). The aggregate multiplier is invariant to γ_b under AM/PF and to steady-state debt in both regimes. It ranges from 0.698 to 0.738 over the determinate AM/PF inflation-response grid, and from 0.721 to 0.733 over the determinate PM/AF fiscal-feedback grid. Switching from simple AM/PF to PM/AF raises the aggregate multiplier by only 0.024 when $n = 0.005$ and 0.017 when $n = 0.15$.

[51] We consider the baseline economy size $n = 1/200 = 0.005$ and the larger-economy robustness $n = 0.15$, retaining $\omega = 0.95$ and $\omega^\star = 0.63$ in both cases.

[52] https://www.imf.org/-/media/files/publications/cr/2025/english/1mwiea2025001-source-pdf.pdf

[53] Positive debt between 0.05 and 1.0 is determinate in both regimes.

Table C2: Transfer multipliers in a model with fiscal dominance

Policy regime	n	Local	Spillover	Aggregate
AM/PF, smoothed Taylor rule	0.005	1.090	-0.446	0.644
AM/PF, simple Taylor rule	0.005	1.090	-0.393	0.698
PM/AF	0.005	1.090	-0.369	0.721
AM/PF, smoothed Taylor rule	0.150	1.004	-0.410	0.594
AM/PF, simple Taylor rule	0.150	1.011	-0.368	0.643
PM/AF	0.150	1.014	-0.354	0.660

The small effect likely reflects where that GiveDirectly transfers don't directly affect the government budget. Government debt is held by Ricardian households, which internalize future lump-sum taxes, while the transfer received by hand-to-mouth households is unchanged across regimes. Fiscal dominance works mainly through inflation and policy-rate valuation of inherited debt; these movements are small on impact relative to the direct transfer-demand and leakage channels. It therefore matters more for equilibrium determinacy than for the impact response of output.