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? We build a two-region New Keynesian small open economy model to answer these questions 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 is sensitive to 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 the 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. Our results imply that local RCT estimates may overstate or understate the short-run effects of a scaled-up program, depending on macroeconomic frictions and the monetary policy regime.

Keywords: cash transfers, randomized control trials, financial stress, 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.[1] 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 1.5m 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 control 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 macroeconomics 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, leading to little impact on local output. Moreover, as externally-funded transfers scale up, general equilibrium effects including through mechanisms like exchange rate adjustment are likely to become more important.

This paper investigates the short-run macroeconomic effects of temporary cash transfers in developing countries. 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, though we also consider other variables like inflation. Our ultimate objective is to simulate how the multiplier changes as the cash transfers

[1] The number of global recipients has increased from around 500 million before the COVID-19 pandemic to 1.4 billion in 2020–21 (Gentilini (2022); World Bank (2018))

scale up. To that end, we first build a general equilibrium model and analyze whether cash transfers to residents of a treated region boost local GDP, and what mechanisms or parameters drive the results. 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 who pays a cash transfer to residents of the treatment region. Along with nominal rigidities, our model incorporates salient frictions of developing economies at the household and macro levels. There are 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 key features of developing economies emphasized in the open-economy literature including 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)). It turns out that these macro-level features will be key in determining the effect of scaled-up transfers.

To discipline the model, we exploit rich baseline microdata from an 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 simulate our model based on the main ongoing RCT, which involves a large one-time cash transfer from GiveDirectly to households in the Chiradzulu district of Malawi.[2]

We find that the local output multiplier in the baseline is slightly less than one, i.e. if a treatment region gets a \$1 more in cash transfers than control regions, its output goes up by about \$1 in the first year. While this is smaller than the 2.5 estimated by Egger et al. (2022) in Kenya, the numbers only differ by a little over one standard error. Given that firms do not adjust prices much in response to demand shocks, there is little inflation in the treatment region. We further show that the local multiplier depends crucially on the degree of price stickiness, the strength of

[2] When the RCT is complete, we can compare the local multiplier estimates from our model to those measured in the RCT. We also utilize information from a recently completed RCT in Khongoni subdistrict in Malawi (Egger et al 2026), and compare our predictions to the published estimates from Kenya in Egger et al. (2022).

local bias in consumption, and the fraction of hand-to-mouth households in the local economy. Intuitively, these parameters determine the strength of the demand channel in the local economy. When the treatment region is small, like a village or a district in Malawi with a size of about 0.5% of the country, open economy features such as the exchange rate or capital account regime do not affect the size of the local multiplier. It turns out that financial stress also has a small impact on the local multiplier.[3]

Our model also suggests that cash transfer in one region of the small open economy can spill over to other regions and have important aggregate implications. The aggregate multiplier, i.e. how much output changes in Malawi when there is $1 cash transfer, is sensitive to the macroeconomic policy environment. Intuitively, when a treatment region receives cash transfers, there are two opposite effects on the control region. On the one hand, transfers in the treatment region raises demand for the control region's tradable goods, leading to a positive spillover effect. On the other hand, the foreign currency inflow can also causes the real exchange rate to appreciate, causing net exports to fall, leading to a negative spillover effect on the control region. In equilibrium, depending on the exchange rate regime and capital controls, spillovers to the control region can be positive or negative. In our baseline calibration, we find that in an economy where the capital account is closed, i.e. there is no international borrowing and lending, spillovers from a treatment region to the rest of the economy are negative, so the aggregate multiplier is smaller than the local multiplier. On the other hand, spillovers are positive when the country can save and borrow from international financial markets, leading the aggregate multiplier to be larger than the local multiplier. The size of the aggregate multiplier can be even larger in a fixed exchange rate regime with an open capital account.

Our local and aggregate multiplier estimates have important implications for effects of a scaled-up cash program. As the size of the treatment region expands, international macroeconomic considerations become 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. In our calibration, scaling-up the transfer program has less effect on the local multiplier if the capital account is open, but can lead to a substantial fall in the local and

[3]This is mostly because financial stress declines quickly with cash on hand, but the GD transfer received is large, so the average effect is smaller.

aggregate multiplier if it is closed. For example, if the program were scaled up to treat 15% of the population, the local multiplier would fall by 20% if the capital account were closed, but increase by 0-10% if it were open. This means that local multipliers measured in an RCT may overstate the short-run local effect of a scaled-up cash transfer program in an economy where capital flows are restricted.

Related literature. Our paper contributes to a small but growing literature on the macroeconomic impacts of cash transfers in developing countries. We also relate and add to a broader literature on the micro impacts of cash transfers in developing countries, the size of fiscal multipliers in general, and the determinants of business cycles in emerging markets.

As mentioned earlier, Egger et al. (2022) estimate the effects of a large temporary transfer in Kenyan villages via an RCT. Other empirical papers include Gerard et al. (2021) and Mendes et al. (2026), who study the short-run effects of a permanent transfer program in Brazil. All three papers find large positive macroeconomic effects, though the contexts differ in important ways.[4] Unlike these papers, we build a New Keynesian small open economy model to study *both* local and national effects of cash transfers rather than empirical estimates. Our paper is also related to Walker et al. (2025), who model the local cash transfer multiplier using a supply-side slack-based mechanism, rather than the New Keynesian model as we do.[5] An important difference is that our model considers prominent open economy aspects of developing countries such as international capital flow and exchange rate regimes and show that they affect the impact of cash transfers at the national level and have important implications about the scaling-up of these transfer programs.[6]

Our paper also adds to a large literature on understanding the macroeconomic impact of fiscal policies. Most of this literature focuses on the national level in advanced economies, as in Ramey (2011, 2019), Auerbach and Gorodnichenko (2016); Ramey and Zubairy (2018); Miyamoto et al. (2018). Another strand of the literature uses cross-sectional variation across US states and municipalities to estimate the local effects of government spending such as Chodorow-Reich et al. (2012); Nakamura and Steinsson (2014) and many others. Pennings (2021) estimates the local impact of both temporary and permanent transfers in US states. A small part of the literature estimates

[4]Our paper is also related to Bracco et al. (2021), who estimate national transfer multipliers in emerging and advanced economies and rationalize them using a variation in the hand-to-mouth share.

[5]Murphy (2017) considers a similar slack-based mechanism, though in a different context.

[6]There is also a large literature on the microeconomic effects of cash transfers, much of which stems from RCTs (see Bastagli et al. (2016) for a survey). A recent strand of this literature has raised concerns about the possible price effects of cash transfers, especially in remote locations with little supply capacity (Cunha et al. (2019) and Filmer et al. (2023)).

fiscal multipliers in developing countries, including Kraay (2012), Kraay (2014), Sheremirov and Spirovska (2022) and Miyamoto et al. (2019), who often find smaller multipliers in developing than developed countries. We contribute to this literature by developing a general equilibrium model with features specific to developing countries to simulate not only the local but also aggregate effects of cash transfers. We exploit the rich microdata in Malawi to calibrate key parameters of the New Keynesian small open economy model and ask how this model predicts the effects of a temporary transfer from GiveDirectly to Malawi. The counterfactual exercise in our model where we scale up the cash transfers program can guide policymakers on the potential effects on the aggregate economy. Our paper highlights the importance of macroeconomic policy environment such as capital control and exchange rate regimes in understanding the effects of cash transfers.

Finally, our paper contributes to the international economic literature studying business cycles in developing countries. Similar to these papers, our framework embeds a financial friction in the reduced-form of a debt-elastic interest rate. We shed light on the role of financial frictions, capital controls and exchange rate regimes in the aggregate implications of cash transfers.

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 presents intuition on the drivers of local multipliers. We present the main quantitative predictions of the model for local and aggregate multipliers 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

This section provides background on GiveDirectly's cash transfer programs in Malawi and on the macroeconomic environment in which they are delivered. These features shape our model and calibration in the sections that follow.

2.1. Cash transfers by GiveDirectly in Malawi

GiveDirectly is a non-governmental organization that delivers large lump-sum unconditional cash transfers directly to recipients via mobile money, and has to date reached over 1.6 million people in 15 countries. In Malawi, recipients receive around US$550 per adult—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 has two cash transfer programs in Malawi connected to this paper. The first is a smaller project in the Khongoni subdistrict (approximately 72,000 people), 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 2026) 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 C3 and C4).

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, in two phases—covering the southern TAs first and then the northern TAs—over 2025–2026. GiveDirectly conducts follow-up household and enterprise surveys after disbursement, and we exploit the household and enterprise surveys from Phase 1 to calibrate the model. The endline survey findings of the RCT in the future can be compared with our model's findings of the transfers' impact on local economy.

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 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 (thatched-roof households within eligible villages, reaching about one-third of households in two-thirds of villages) and corresponded to roughly 15% of village-level GDP in treated villages and only about 5% of county GDP.

2.2. Malawi background

Malawi is a low-income economy of 21 million people with a GDP of about US$13 billion and a gross national income per capita of US$570, making it one of the poorest countries in the world; roughly 75% of Malawians live in extreme poverty. Agriculture is the dominant sector: nearly two-thirds of households work in agriculture, most in subsistence rain-fed farming, and raw tobacco together with other agricultural products accounts for the bulk of exports. With a limited manufacturing base, Malawi imports most fuel, capital goods, and consumer products, and runs a structural trade deficit.

Malawi's macroeconomic policy environment is central to the mechanisms we study. Malawi officially transitioned to a floating exchange rate regime in 2012, but in practice the regime is heavily managed, with frequent intervention by the Reserve Bank of Malawi and a persistent parallel-market premium on foreign exchange. The authorities also rely on capital controls to help sustain the structural trade deficit. Together, the managed exchange rate and restricted capital account place Malawi somewhere between the textbook "fixed" and "flexible" polar cases, which is why our general equilibrium analysis in Section 6.2 and counterfactuals in Section 7 consider both capital account openness and the degree of exchange rate management as separate policy dimensions.

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 monetary with two regions, who trade both goods and bonds with a rest-of-the-world (ROW) block. Two regions in the small open economy is in a monetary union: a treatment region, 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 size $1 - n$, who does 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. 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-contigent bonds. Their period-by-period budget constraint is given by

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

where P_t is 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 in ROW currency, US dollars (USD), for domestic households, W_t denotes nominal wage, ex_t is the nominal exchange rate (Kwacha per USD), NTR_t denotes nominal transfer to the Ricardian households, and Π_t^R are firm's nominal profit. 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 goods 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 are 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.[7] The problem for Ricardian households in the control region is analogous, and we add a star to the variables to denote their variables.

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 superscript N denotes HtM households' variables, C_t^N and L_t^N denote their consumption and labor, respectively, and M_t is the 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 ss subscript denotes steady state values of the variable, $\phi_D > 0$ 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_t, represents productive time lost to financial stress, measured as working hours distracted by financial problems. In our formulation, we can interpret $\widetilde{D}\left(M_t^N\right) = \overline{D}^N exp\left(-\phi_D^N \frac{1}{C_{ss}^N}\left(M_t^N - M_{ss}^N\right)\right)$, as the financial stress that HtM faces and $\overline{D}^N$ is normalization. A higher value leads to less disutility from labor, leading to more labor supply, or higher productivity, and ϕ_D measures how much distracted hours decline. 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 steady state cash on hand, M_{ss}^N,is not zero. In addition, HtM households are unsophisticated, meaning they do not optimize with respect to M_t.

Similar to the Ricardian households, HtM households consume both tradable and nontradable

[7] 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.

goods, i.e.

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

Tradable consumption good is a composite of tradable goods of different origins: treatment and control regions and ROW as follows:

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

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 firm i, so the tradable sector aggregate output and non-tradable sector aggregate output are 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:

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

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 local 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 that there is only tradable sector in the ROW, for simplicity. Cash transfers are financed by the ROW, and 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

$$X_{h,t}^{T,rw} = \left(\frac{P_{h,t}^{T,rw}}{P_t^{T,rw}}\right)^{-\theta_T^{rw}} \alpha_h^{T,rw} X_t^{T,rw}, \tag{10}$$

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. 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

$$X_{f,t}^{T,rw} = \left(\frac{P_{f,t}^{T,rw}}{P_t^{T,rw}}\right)^{-\theta_T^{rw}} \alpha_f^{T,rw} X_t^{Tw}, \tag{11}$$

and the real exchange rate between the control region and ROW, $\equiv q_t^{rw*}$, 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:

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

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, market clears for output 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

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

All bond markets clear. In particular, the domestic bond market clears as follows

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

Resource constraint for the treatment region is given by

$$P_t C_t + (1-\omega)\left(\frac{B_{t+1}}{R_t^*} + ex_t \frac{B_{w,t+1}}{R_t^{rw}} - (B_t + ex_t B_{w,t})\right) = NTR_t + P_{h,t}^T Y_t^T + P_{h,t}^S Y_t^S, \quad (16)$$

and that for the control region is

$$P_t^* C_t^* + (1-\omega)\left(\frac{B_{t+1}^*}{R_t^*} + ex_t \frac{B_{w,t+1}^*}{R_t^{rw}} - \left(B_t^* + ex_t B_{w,t}^*\right)\right) = NTR_t^* + P_{f,t}^{T*} Y_t^{T*} + P_{f,t}^{S*} Y_t^{S*}. \quad (17)$$

Adding up treatment and control regions with population sizes as weights yield the following condition

$$\begin{aligned} & n(1-\omega)\left(ex_t \frac{B_{w,t+1}}{R_t^{rw}} - ex_t B_{w,t}\right) + (1-n)(1-\omega)\left(ex_t \frac{B_{w,t+1}^*}{R_t^{rw}} - ex_t B_{w,t}^*\right) \\ & + n(1-\omega)\left(\frac{B_{t+1}}{R_t^*} - B_t\right) + (1-n)(1-\omega)\left(\frac{B_{t+1}^*}{R_t^*} - B_t^*\right) \\ & = nP_{h,t}^T X_{h,t}^{T,rw} + (1-n)\, P_{f,t}^{T*} X_{f,t}^{T,rw} + nNTR_t^{reg,3} \\ & - \left(n\left[\omega P_{w,t}^T C_{w,t}^{N,T} + (1-\omega)\, P_{w,t}^T C_{w,t}^{R,T}\right] + (1-n)\left[\omega P_{w,t}^{T*} C_{w,t}^{N,T*} + (1-\omega)\, P_{w,t}^{T*} C_{w,t}^{R,T*}\right]\right). \quad (18) \end{aligned}$$

3.7. Monetary policy

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

$$dR_t^{agg} = \rho_R dR_{t-1}^{agg} + (1 - \rho_R)\left(\phi_\pi d\pi_t^{agg} + \phi_Y dY_t^{agg} \phi_{ex} dex_t\right), \tag{19}$$

where we assume that monetary policy authority responds to inflation, output gap and the nominal exchange rate.

3.8. Fiscal policy

GD transfers are one-time untargeted transfers from the ROW to all households in the treatment region.

4. Calibration

This section discusses the calibration of our model. We first describe how we calibrate three key parameters highlighted in Section 5: price stickiness, the fraction of hand-to-mouth households and local bias in consumption. Then, we present the rest of the calibrated parameters.

4.1. Price stickiness

We calibrate the parameters for firms' price setting based on two seemingly contradictory narratives from the data.

First, prices seem to be very sticky in that firms do not respond to demand shocks by raising prices. 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 C4, Egger et al 2026). This is consistent with the findings of Egger et al. (2022) also find no evidence of inflation in the Kenyan villages that receive cash transfers. Moreover, in the enterprise survey in Chiradzulu, in response to a question about a hypothetical demand shock, only 20% of the enterprises said they would change their prices if demand doubled, and the rest replied that they would not. These results suggest very inflexible prices in response to demand shocks.

But, at the same time, prices seem to be quite flexible. Malawi experiences high, volatile and persistent inflation at the aggregate level (Appendix Figure C5). In 2024, consumer price inflation in Malawi was around 30%, suggesting that firms can and do change prices regularly.[8] Annual

[8]See Gagnon (2009), Alvarez et al. (2019). Intuitively, with inflation so high, firms that did not regularly adjust prices would likely go out of business.

inflation is also highly persistent, with an autocorrelation of around 0.8, which is twice as large as that of the US. The enterprise survey in Chiradzulu also suggests prices change often. In particular, average age of prices is only 4.4 months, suggesting a $\theta_q = 0.5$, which is consistent with Herreño et al. (2025)'s evidence from India.

These seemingly contradictory facts can be resolved by assuming that firms adjust price frequently but mostly to index to inflation. Specifically, we calibrate the fraction of firms who do not adjust prices to the average age of prices, so $\theta_a = 0.5^4 = 0.0625$ 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 who can reset prices, 80% of them are rule-of-thumb, i.e. $\omega_{bl} = 0.8$, compared to 25-50% in the US 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 fraction of the population that lacks liquid assets which could be accessed in an emergency. We use a cut off of 50,000 Kwachas (USD30) which is 1/20 GNIPC and so represents a few weeks' income. 1/20 GNIPC is a cutoff used in the Global Findex question on ability to come up with emergency funds equal to 1/20 of GNIPC, and so used by Bracco et al. (2021), Mendes et al. (2026) and Mendes and Pennings (2025) as an internationally comparable measure of the amount liquid assets. In the Chiradzulu household survey, we find that 95% of the survey respondents report having less than US$30 in savings, and so calibrate $\omega = 0.95$. 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 (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 C3 reports estimates by Egger et al (2026) of the MPC from large GD one-time transfers in the Khongoni subdistrict of Malawi.[9]

[9] 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.

The estimates suggest that almost all the large transfer timing was spent within the year, consistent with a 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 the households have electricity, and so a high HtM share seems reasonable.

4.3. Home bias

We calibrate the home bias in consumption to be 0.52 based on both household and enterprise survey data in Chiradzulu. Consistent with definition in our, the home region consists of treatment region of Chiradzulu, whereas the control region consists of the rest of Chiradzulu and the rest of Malawi (we relax this in Section 8) Estimating the home bias parameter requires three ingredients. First, we need the location where each household purchase is made. Second, we need the residential composition of sellers in each location, which determines the share of expenditure accruing to treated-village residents. Third, we need an adjustment for imported intermediate inputs, which allows us to compute the local *value added* generated by each dollar received by residents.

We combine information from our two main micro datasets, the household and enterprise baseline surveys, with a small number of assumptions to construct these objects. To improve the accuracy of our estimates and of the assumptions underlying them, we categorize expenditure into three sectors: food, non-food, and services. Based on the two surveys, we can identify the amount households spend for each location and sector (food, non-food, and services), the probability that the purchased good/service is sold by a resident of a treated village and the local content (which is defined as the local value added share of the good after subtracting intermediate input costs). We then aggregate across goods and location to get a measure of home bias. We then calibrate $1-\alpha_C = 0.52$, and assume no home bias for tradable goods. Details on the procedure and estimates are presented in Appendix A and in Appendix Table A1. We note that our home bias is lower than calculated by Egger et al. (2022) for the Siya region of Kenya, which is discussed further in the Section 8.

4.4. Foreign export shares

We also compute steady state shares $\alpha_w^T, \alpha_w^{T*}$ of exports from Malawi to ROW as follows. In the last five year, exports and imports in Malawi account for 11% and 31% of GDP, respectively. Since our model assumes balance trade in the steady state, we simply assume that half of the traded goods in consumption is imported from abroad, i.e. $\alpha_w^T = 0.5$. Given that the traded share of consumption is $\alpha_C = 0.48$, this calibration implies that 24% of GDP is export in the steady state.

4.5. Financial stress parameterization

In order to calibrate the financial stress function $D(M_t^N)$, we draw upon the information from the Phase II household baseline survey from Northern Chiradzulu District ($\approx 1,500$ observations). In particular, we include 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.

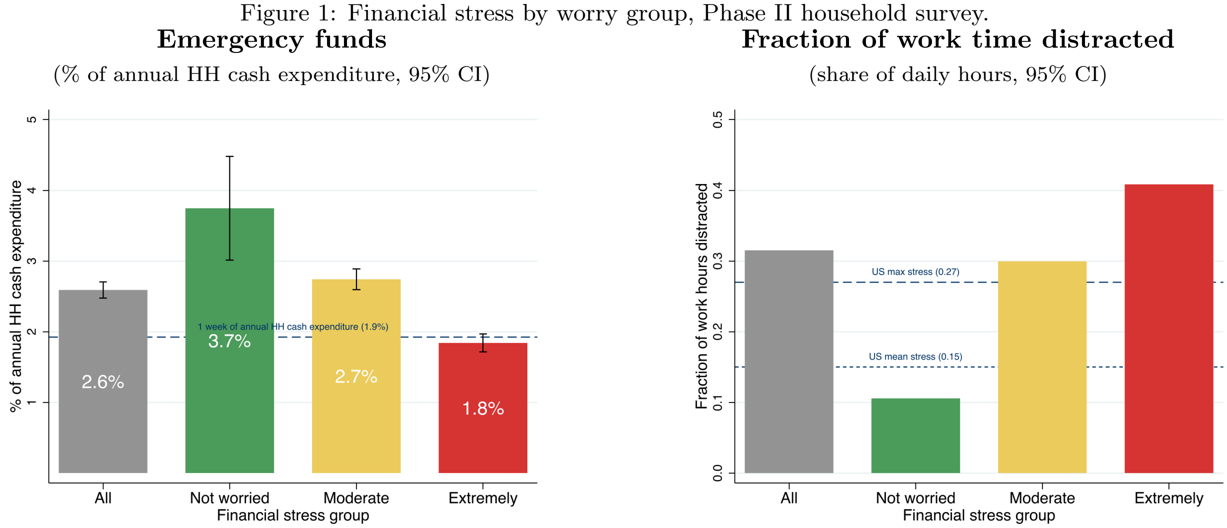
Panel A of Figure 1 summarizes the amount of money households could raise within one week in case of an emergency as a share of annual household consumption expenditure. We group respondents into three financial stress categories based on their self-reported worry level: not worried (score 1), moderate (scores 2–4), and extremely worried (score 5). We also report an "All" group pooling the full sample.[10] As expected, the qualitative stress groups correlate negatively with emergency funds: moderately worried households have enough funds to get through one and 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 but statistically significant.

Panel B of Figure 1 shows 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, which is similar to the 27% stress reported for financially constrained households in the United States in Sergeyev et al. (2024). Panel B of Figure 1 also suggests 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%

[10] 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.

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



Given the information above, we calibrate three parameters: the 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, Tr_t/C_{ss}. First, we calibrate $\bar{D}^N$ so that households spend 30% of their time distracted in steady state. Second, the ratio Tr_t/C_{ss} is set to be one, since the average transfer to households (\$1,050 = 2 adults × \$550 per adult) is roughly equivalent to one year of household consumption expenditure. Finally, we set $\phi_D = 1.10$, so that the level of financial stress is zero when households receive GD transfer.[11] We examine in the robustness check how our results for the local and aggregate multiplier change when ϕ_D is larger.

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.[12] These parameters together with the steady state consumption share

[11] While we observe a large decline in stress observed in the survey cross section even for much smaller variation in funds availability, 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] 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 GHH preferences.

fully characterize household preferences by first order approximation. In the baseline, the size of 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 to be 1, so consumption is a Cobb-Douglas function of tradable and non-tradable consumption. The elasticities of substitution between treatment region, control region and the rest of the world consumption for each type of consumption goods θ_T and θ_S are also set to be 1, based on the short-run elasticity evidence from Boehm et al. (2023). As Malawi's main exported goods are agricultural products such as raw tobaccos, we set the elasticity of substitution for export demand from the ROW to be 2. We examine how our model-implied local and aggregate multipliers vary with respect to these elasticities in the robustness check.

Besides the fractions of firms adjusting prices every period and the rule-of-thumb firms, we set the elasticity for differentiated goods to be 21. There is no wage rigidities in the baseline. In the production function, the elasticity of labor α_L is set to be 0.66, and the elasticity of utilization is $1 - \alpha_L$. In the baseline, we assume no variable utilization, so the cost of utilization for each sector, $\phi_{2,CU,i}/\phi_{1,CU,i}$ for $i = (T, S)$, is set to be very large (10000).

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, ϕ_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 central bank does not control exchange rates.

5. Intuition for the Local Multiplier

Before turning to quantitative results, we first provide intuition for the key mechanisms in our model driving local output responses to cash transfers. We define local multipliers as the change in local GDP when the treatment region receives an extra \$1 cash transfers relative to the rest of the economy. Consider the treatment region in the limit as it becomes small relative to the national economy ($n \to 0$). In this case, 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. The size of the local multiplier depends on three key parameters: the degree of price stickiness, the share of hand-to-mouth households, and the home bias in consumption.

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	0.48	Share of home in nontradable consumption
$\alpha_w^T, \alpha_w^{T*}$	0.5	Import shares from ROW for tradable consumption
$\alpha_{T,h}$	$(n + 0.001)(1 - \alpha_{T,w})$	Home bias for tradables (α_T)
$\alpha_{T,f}$	$1 - \alpha_{T,h} - \alpha_{T,w}$	Foreign share for tradables
$\alpha_{S,f}$	$1 - \alpha_{S,h} - \alpha_{S,w}$	Foreign share for non-tradables
θ_C	1	Elasticity of substitution between T and S
θ_T, θ_S	1	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	Sticky 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
ϕ_B, ϕ_B^*	0.0001	Debt adjustment cost parameter
$\phi_{B,w}$, $\phi_{B,w}^*$	0.0001	Portfolio adjustment cost parameter
$\phi_{R,rw}$	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_{DN}	1	Elasticity for financial stress

Notes: The baseline calibration abstracts from utilization, so $\phi_{2,CU,T}/\phi_{1,CU,T} = 10000$ and $\alpha_U = 1 - \alpha_L$.

Two limiting cases. To build intuition, consider two limiting cases. In the *Keynesian* limit, where prices are fully rigid ($\theta_p \to 1$) and households are patient ($\beta \to 1$), the local multiplier for an untargeted one-time transfer takes a simple closed-form expression:

$$\mathcal{M} = \frac{\omega \times hb}{1 - \omega \times hb}, \tag{20}$$

where ω is the share of hand-to-mouth households and $hb = 1 - \alpha_C$ is the home bias in consumption, i.e. the share of each dollar of expenditure that accrues to local residents. Equation (20) 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 (only the hand-to-mouth fraction ω receives the untargeted transfer). 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.

In the *Neoclassical* limit, where prices are fully flexible ($\theta_p \to 0$) and all households are Ricardian ($\omega \to 0$), the local multiplier is approximately zero. Ricardian households save the temporary transfer, and any increase in local demand is offset by price adjustments rather than output expansion.

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 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 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 treatment region and ROW. In the Keynesian model, local GDP expands until households wish to purchase imports equal to $(1 - hb)(\Delta Y + 1)$ dollars, where ΔY is the change in local output. 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.

6. Quantitative Results: Local and Aggregate Multipliers

This section presents the local multipliers and the aggregate implications with the baseline calibration.

6.1. Local Multipliers

We begin by presenting the model's predictions for local multipliers when the treatment region is small relative to the national economy ($n \to 0$), as in the Chiradzulu RCT where $n = 1/200$.

Figure 2 plots the first-year local GDP multiplier along with the first-year local inflation across parameterizations. In the baseline, the model implies a local GDP multiplier of approximately 0.9, with small local inflation of about 1 percentage point. That is, for every dollar of cash transfers received by the treatment region more than 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.

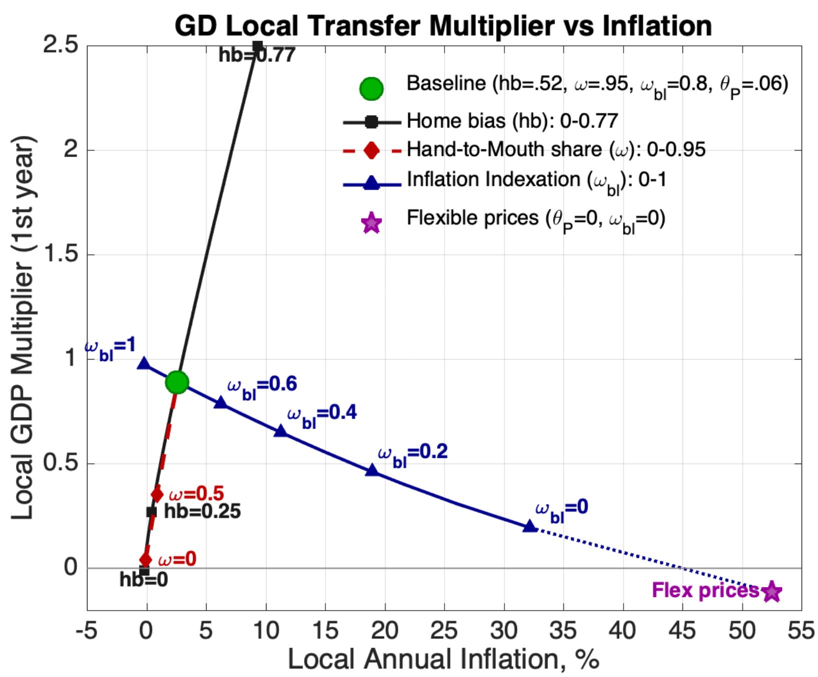
The impact multiplier captures nearly all of the output response: there are few later-year dynamics in local GDP. The cumulative multiplier, defined as the ratio of cumulative GDP gains to cumulative transfers, remains close to the impact multiplier. This is because the one-time transfer generates little 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.

Consistent with our intuition based on the limiting cases above, the model with flexible prices produces a negative local output multiplier and high inflation, as plotted in Figure 2. 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 the wealth effect, which lead 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, as 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, the NK demand channel weakens, lowering local output multiplier and increasing inflation.

Our baseline model can imply a smaller local output multiplier close to 0 if there is no hand-to-mouth households in Malawi's treatment region. Intuitively, Ricardian households save the one-time transfer, instead of demanding more goods, causing local output not to change by much. Finally, our model analysis 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 the one-time cash transfers to a Malawian village can be large. In fact, if $hb = 0.75$, that is the level of home bias in Malawian village is the same to that of Kenya as in Egger et al. (2022), local output multiplier would be close to 2.5.

Figure 2: Local GDP multiplier vs. local inflation across parameterizations. The baseline calibration yields a multiplier of approximately one with small inflation. Each point corresponds to a different parameterization of the model, varying the hand-to-mouth share, price stickiness, home bias, and financial stress.



6.1.1. *Comparison with Egger et al. (2022)*

To understand whether our baseline local output multiplier of nearly 1 is reasonable, we compare our model's predictions with the empirical estimates from Egger et al. (2022)'s RCT of GiveDirectly transfers in rural Kenya in Table 2. The model's GDP multiplier of 0.9 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). Using Egger et al. (2022) alternative estimates adjusting for imported intermediates of 2.05, the gap narrows further.

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**	**0.89**
Consumption	2.04	1.65	1.82
Non-Tradable Cons			0.93
Tradable Cons			0.89
Investment & Inventories	0.55	0.41	0
Net Exports	**0**	**-0.53**	**-0.93**
Exports (ROW+Control R)	0	0	-0.04
Imports (ROW + Control R)	0	0.53	0.88

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

Surprisingly, the consumption multiplier is nearly identical across the two settings: approximately 2 in both the Kenyan RCT and our model. The key 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, and more importantly, the model predicts a large increase in imports from the control region and the rest of the world, generating net exports of -0.93. 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. In contrast, Egger et al. (2022)'s main specification assumes zero net exports, though their import-adjusted estimates suggest a net export response of -0.53. Our model suggest this may understate the true import leakage if some import flows were unmeasured.

As noted above, in fact, our model can generate a local output multiplier of nearly 2.5, which is close to Egger et al. (2022)'s point estimate, if the home bias parameter is raised from our baseline of $hb = 0.52$ 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 8.1 for a further discussion.

6.1.2. The role of financial stress

Financial stress operates through the labor supply channel. When hand-to-mouth households receive a cash transfer, their cash on hand M_t^N increases, which reduces the financial stress term $D(M_t^N)$ and thereby lowers the disutility of labor. This effectively boosts labor supply in the period of the transfer.

The quantitative importance of financial stress depends critically on whether output is demand- or supply-determined. In the baseline calibration with sticky prices, where output is largely demand-determined, financial stress does not increase the local multiplier by a negligible amount (0.01). Intuitively, when firms are already willing to expand production to meet demand, an additional boost to labor supply has limited effect on output. By contrast, when prices are fully flexible and output is supply-determined, financial stress increases the multiplier by a 0.1, as the expansion in labor supply directly translates into higher output.

We note that the small quantitative importance of financial stress in determining local output multiplier depends crucially on ϕ_D. As discussed above, we impose a small value of ϕ_D as we assume that the large transfers of the magnitude in GD's RCT in Malawi can at most eliminate financial stress. However, when 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 US in Sergeyev et al. (2024), financial stress plays a larger quantitative role, especially in a flexible price environment.

Regardless of the price stickiness assumption, financial stress always reduces the inflationary impact of cash transfers. The boost to labor supply partially offsets the demand pressure, allowing firms to meet higher demand with less upward pressure on prices. This prediction is qualitatively consistent with the absence of inflationary effects observed in the Khongoni pilot.

6.2. Spillovers and the National Multiplier

We now turn from the local multiplier—which an RCT can in principle 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 subsection. The *spillover multiplier* is $\frac{\Delta Y_c}{\Delta Tr_h}$, capturing the effect of the treatment-region transfer 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 GDP. 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 side and sign of the aggregate multiplier.

As Malawi relies on capital control and managed exchange rate regime to sustain its trade deficit, we consider three macro policy environments: (i) a closed capital account with a floating exchange rate, (ii) an open capital account with a floating exchange rate, and (iii) an open capital account with a fixed exchange rate. Figure 3 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 (first bar), the spillover multiplier is about -0.4, which means that for every \$1 of GD transfer to the residents of the home region in the first year, GDP in the control region, i.e. the rest of Malawi, falls by 0.4. Combining the positive and unchanged local multiplier of 0.5 and the spillover multiplier of -0.4, the aggregate multiplier is 0.5—about half the local multiplier.

The rest of Figure 3 shows spillover and aggregate multipliers are much larger when the capital account is open. Note that a closed capital account is achieved by a very large debt-elastic interest spread $\Phi'_{Rw}() \rightarrow -\infty$, which we now set close to zero to open the capital account. The middle bar shows that opening the capital account while keeping the ER flexible *flips* the sign of the sign spillover multiplier from -0.4 to 0.5, so the aggregate multiplier is now becomes 1.4. Fixing the exchange rate in the final red bars further boosts the spillover multiplier by 0.4, such that the aggregate multiplier is now 1.8, with equal contributions from the local and aggregate multipliers. Note that the benefits the open capital account fixed ER regime fade at longer horizons, as discussed in Section 8.

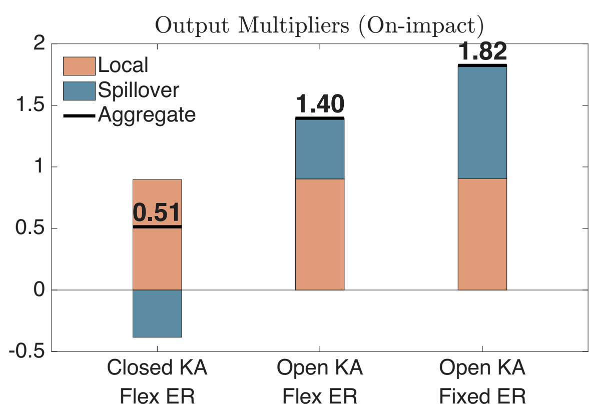


Figure 3: Local, spillover, and aggregate multipliers under alternative macro-policy regimes: closed capital account and flexible exchange rate, open capital account and flexible exchange rate, and open capital account and fixed exchange rate.

GD transfers can have positive or negative spillovers to the control region because there are two opposing mechanisms. On the one hand, there are positive spillovers: a GD transfer increases 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 are negative spillovers: foreign currency inflows lead to an appreciation of the exchange rate, which reduces the control region's competitiveness. Net export demand falls, which causes the control region's economy to contract.

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

$$\underbrace{\Delta\text{Imports}}_{\text{(A)}} + \underbrace{\Delta\text{Int'l Bond Purchases}}_{\text{(B)}} = \underbrace{\Delta\text{Exports}}_{\text{(C)}} + \underbrace{\text{ER Revaluation}}_{\text{(D)}} + \underbrace{\text{GD Transfer}}_{\text{(E)}}. \tag{21}$$

The GD transfer (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 (B) increase sufficiently to absorb the GD inflow, then the exchange rate need not appreciate (D≈0) and exports need not fall (C≈0)—and hence there is no negative spillover to the control region. Which components adjust, and by how much, depends on the capital account and exchange rate regime. Figure 4 decomposes Balance of Payments into these channels.

6.2.1. Closed capital account

When the capital account is closed, the spillover multiplier is negative, and the aggregate multiplier is below the local multiplier. With international bond purchases shut down (B=0 in equation 21), the entire GD inflow must be absorbed through the current account (black bars in Figure 4). The excess demand for Malawian Kwacha (MWK) causes the nominal exchange rate to appreciate (D>0).[13] This appreciation reduces foreign demand for Malawian exports (C<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.

[13]Rather than plotting the exchange rate movement itself (which is small for $n \approx 0$), we plot the impact of ER movements on the BoP. the first-order effect of an appreciated exchange rate is increase net inflows as export earnings and imports are cheaper.

6.2.2. *Open capital account and the exchange rate regime*

Opening the capital account changes the picture substantially (middle blue bars in Figure 4). Ricardian households can now purchase USD-denominated bonds (B>0 in equation 21), 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 muted (C), 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 (red bars in in Figure 4), the aggregate multiplier is even larger.[14] Fixing the exchange rate eliminates the appreciation channel entirely (panel D), so there is no fall in export competitiveness (panel C). The central banks starts to lower interest rates to fight the appreciation with encourages the purchase of foreign bonds (panel B). The lower the domestic interest rate also stimulates domestic demand, further boosts demand for imports (panel A), 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. Counterfactual: The Macroeconomic Effects of Scaled-Up Cash Transfers

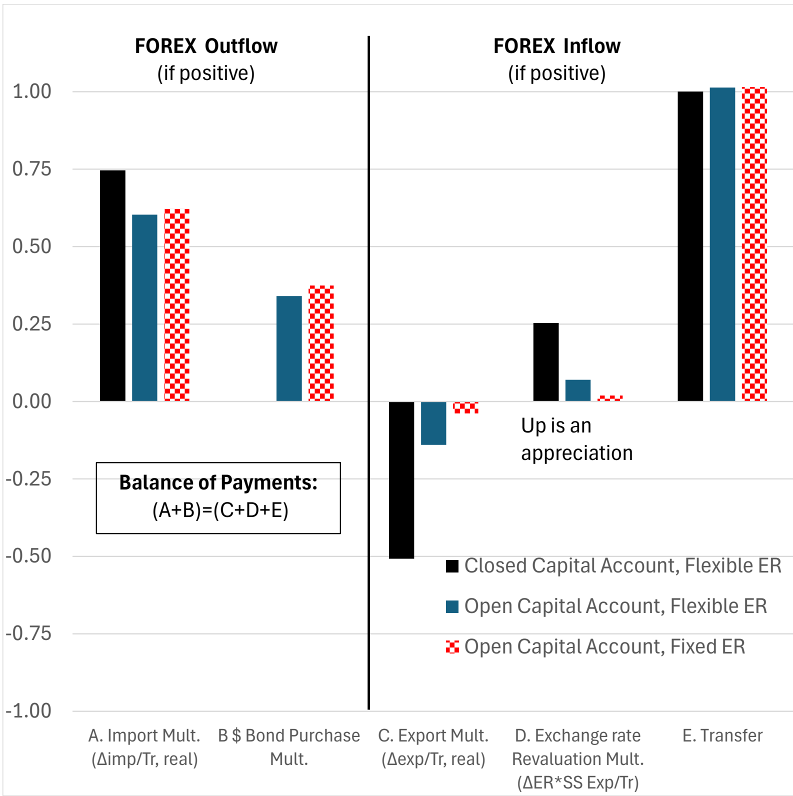
We return to one of the original motivating questions: how will the macroeconomic effects of cash transfers change as the cash transfer program scales up ($\uparrow n$ in our framework)? Are estimates of local multipliers a good guide? Given scaled-up cash transfer cannot be randomized, this can only be answered in a model like ours. This section analyzes the counterfactual motivated by GiveDirectly's ambition to expand coverage in Malawi, but our results have broader applications.

7.1. *Set-up*

GiveDirectly's ambition is to provide transfers to all people in extreme poverty in Malawi, which 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

[14] Recall that the central bank achieves a fixed ER by lowering interest rates when the exchange rate starts to appreciate, $\phi_{er} > 0$ in the Taylor rule.

Figure 4: Decomposition of the aggregate multiplier by component (imports, exports, exchange rate, domestic demand) under closed capital account (black bars), open capital account with floating ER, and open capital account with fixed ER.



Chiradzulu region) to $n = 0.15$, which we denote in graphs with an orange vertical line. We also analyze the full range of outcomes through $n = 1$.

One complication of the counterfactual exercise is that the characteristics of the treatment and control regions change as we scale up. Most importantly, we currently calibrate the hand-to-mouth share of the treatment region $\omega = 0.95$ which is above that of Malawi as a whole of $\omega^{\star} = 0.63$. Hence we need to make assumptions on the distribution of the HtM share across Malawi.

Motivated by the literature and the goals of cash transfer providers, we assume (i) transfers will expand progressive from the poorest to 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 (solid line in Figure C1): 0.95 is consistent with the baseline HtM share of the small home region, and 0.31 is the Htm share in the us from Kaplan et al. (2014). The average HtM share of the home region over the $(0, n)$ fraction of households is shown in the dotted line and converges to 0.63 as $n \to 1$ (whole Malawi gets the transfer).[15]

The assumption of how the HtM share varies with income is consistent with microdata from 2017 World Bank Global Findex. The step function in Appendix Figure C1 plots the share of household who 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 we assume (solid line).

7.2. Results

Figure 5 plots the local and aggregate multipliers as a function the expansion of transfers to a region of size n under the three macro-policy regimes. The solid line represent local multipliers, the dashed lines represent the aggregate multipliers and the gap between them represent the spillover multipliers. The initial points close to $n \to 0$ denotes the calibration in the rest of the paper (such as in Fig).

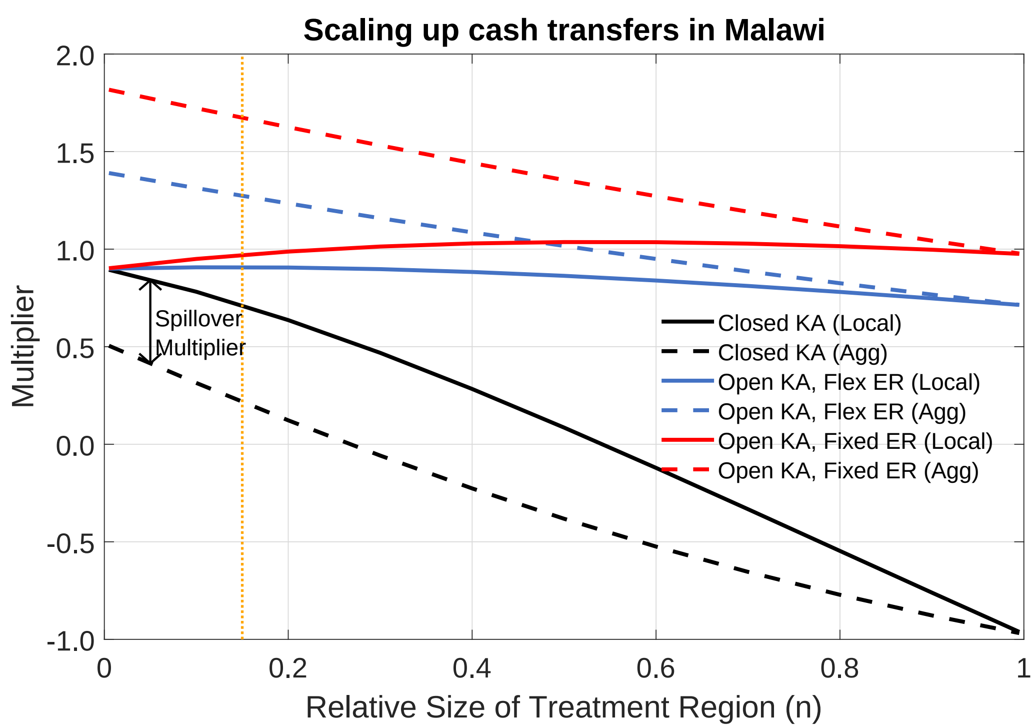
As the transfers scale up, there are two effects. First, the local multiplier converges to aggregate multiplier. Intuitively, as the treatment region grows, it becomes a larger share of the national economy. Hence it becomes more sensitive to macro policy variables like the capital account and exchange rate regimes. For $n \to 1$ local and aggregate multipliers must be the same as the home region becomes the whole of Malawi. This can be seen clearly in a simpler calibration in Appendix

[15]Specifically, this is given by $\omega = 0.95 - 0.32n$ and $\omega^{\star} = 0.63 - 0.32n$, such that $n\omega + (1-n)\omega^{\star} = 0.63\,\forall n$.

C2, where $\omega = \omega^\star$, the aggregate multipliers are constant (unaffected by n) and the local multiplier moves towards the aggregate multiplier. Other things equal, this would suggest a large increase in local multipliers under flexible exchange rates as the program scales.

However, the second change is that the aggregate multiplier also changes because the HtM share in each of the treatment and control regions changes. Although Malawi-wide HtM share is fixed at 0.63, as the program scales up the HtM share in treatment and control regions falls by $0.32n$. As discussed earlier, the local multiplier falls with ω and transfers become less targeted at HtM households. However, the spillover multiplier also falls substantially with $\omega^\star$ as HtM amplifies the impact of variables like the change in exports. For the closed KA case, the aggregate multiplier falls by 1.5 as $n : 0 \to 1$, and for the open capital account cases, the multiplier falls by around 0.75.

Figure 5: Scaling up cash transfers in Malawi: local and aggregate output multipliers with a national hand-to-mouth share fixed at 0.63



Notes: The figure plots the local (solid) and aggregate (dashed) output multipliers of an unconditional cash transfer 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 spillover multiplier is the vertical gap between the local and aggregate curves, illustrated by the double-headed arrow on the closed-capital-account pair near $n = 0.005$. 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 $n = 0.15$.

The quantitative implications of the macro policy environment are significant for a program of realistic scale. For example, at $n = 0.15$ (indicated by the vertical orange line in Figure 5), the local multiplier is about 20 percent smaller than its village-level value under a closed capital account (0.7). In contrast, with an open capital account they are either similar (flexible ER), or 7% larger (fixed ER).[16] These results imply that village-level RCT estimates may substantially over- or understate the effects of a scaled-up program, depending on the macro-policy environment. In alternative environments where the national share of HtM is larger, the importance of the macro policy environment are likely to be even larger.[17]

8. Robustness and extensions

This section analyzes the important parameters in the model in determining the local and aggregate impact of cash transfers.

8.1. Home bias.

We consider two plausible adjustments to our baseline home-bias estimate. These adjustments move in opposite directions and are roughly offsetting, leaving the local multiplier unchanged.[18]

First, our baseline assumes full home bias for home-produced food. This may be optimistic, since home production uses some agricultural inputs—such as fertilizer and pesticides—that are likely sourced from outside treated villages.[19] 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 25% of the value of home-produced food. Under this adjustment, the contribution of home production falls from 24 to 18 cents per kwacha, reducing overall home bias from 0.52 to 0.46 and lowering the multiplier to 0.71.

Second, we note that our home bias parameter is lower compared to Egger et al. (2022), who estimate the local share of value added in rural Kenya at 0.75. The most important reason for this

[16] The figures in this section report impact-year multipliers; at the 5-year cumulative horizon studied in Section 8, the open-capital-account fixed-ER regime no longer produces the largest aggregate multiplier.

[17] For example, if $\omega = \omega^{\star} = 0.95$, then the scaled local multiplier (with $n = 0.15$) would be 30% smaller than the village case with a closed KA and 15-25% higher with an open KA.

[18] Specifically, these two adjustments imply a home bias of 0.53 and a multiplier of 0.93, almost identical to our baseline estimate of 0.9.

[19] Several papers in the macro-development literature argue that agriculture in low-income countries uses very few manufactured intermediate inputs, which motivates our baseline assumption. However, our household survey reveals small but non-negligible purchases of these goods.

is the definition of the home region.[20] Our baseline defines home" as treated villages in Chiradzulu, whereas Egger et al. (2022) define local" as the entire study area (Siaya County), which is much larger and includes both treated and untreated villages.[21]

Adopting a similar approach and redefining "home" as all of Chiradzulu District increases home bias for two reasons. First, all Chiradzulu villages are now part of the home region. Second, virtually all sellers in the markets reside within the home region, according to the enterprise survey.[22] This broader regional definition raises home bias to 0.59, with a corresponding local multiplier increasing to 1.18. While closer, it is still around half that estimated in Egger et al. (2022).

8.2. Dynamics & Cumulative Multipliers.

In this section, we examine how our impact multipliers change when we consider longer horizons. Figure 6 shows 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 our 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.[23]

The top row of Figure 6 shows little dynamics: cumulative local multipliers do not depend on the horizon. Across all three regimes, treatment-region GDP rises by about 0.9 dollars in the year of disbursement and returns to baseline the following year, so the cumulative local multiplier is 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

[20]Another reason is a higher intermediate share sourced in other regions. This is measured as 0.3 in our enterprise survey, but is calibrated at 0.18–0.2 in Egger et al. (2022), based on assumptions about the import content of intermediates by enterprise type.

[21]This results in resulting 95% of spending in the local region in Egger et al. (2022), rather than 75% here.

[22]Local content is unchanged. In the baseline, imported intermediates are already defined as inputs sourced from outside Chiradzulu (Blantyre, other districts, or abroad), so expanding the home region to the full district does not affect LC_s.

[23]Recall that because the transfer is one-off in the first year, the sum of GDP impacts through year t equals the cumulative multiplier.

flexible ER, 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 ER the effect on control-region GDP remains substantially negative even at year 5.

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 0.3 — both well below the impact-year multipliers of 1.4 and 1.8 respectively. The closed-capital-account regime has the lowest cumulative aggregate multiplier at the 5-year horizon (0.1). 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.[24]

[24]Discounting the 5-year GDP impacts at the model discount rate $\beta = 0.96$ preserves the ranking. At the 10-year horizon, the open-capital-account fixed-exchange-rate cumulative multiplier turns negative because the negative spillovers under fixed ER take longer to mean-revert

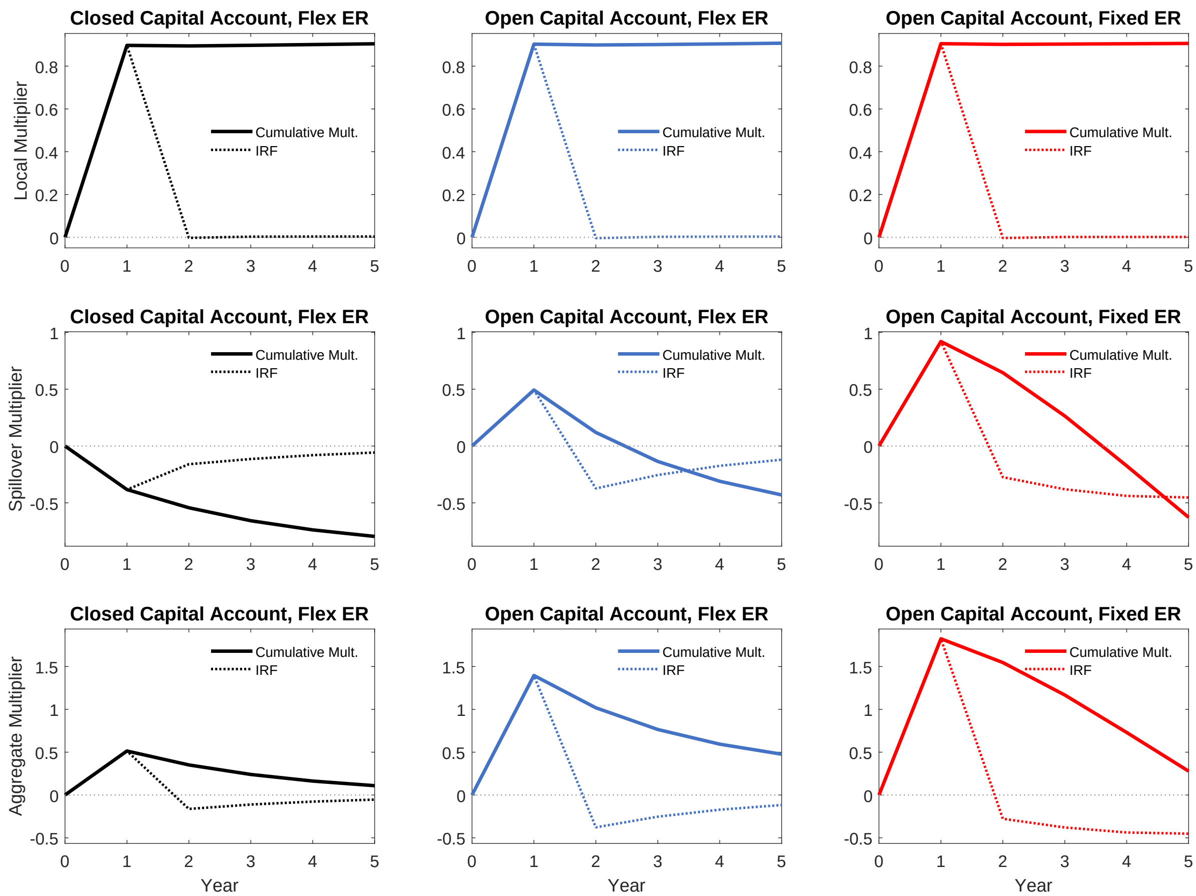


Figure 6: Per-period IRFs and cumulative multipliers by policy regime

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: Local $= Y^{tr}_{e,t}$, Spillover $= Y^{ctrl}_{e,t}\,(1-n)/n$, Aggregate $= Y^{agg}_{e,t}/n$ (so Aggregate $=$ Local $+$ Spillover). Time is annual, with $t = 0$ denoting the pre-shock steady state.

8.3. Price Indexation

In this section, we investigate robustness to the type of price indexation (or lack thereof). Recall that our default calibration involves 80% Gali-Gertler rule-of-thumb indexers, who index to national population-weighted sectoral inflation.[25] Our first alternative has firms index to their own region's past sectoral inflation instead. We also compare this to standard Calvo pricing without indexation, where 62% of firms are not able to adjust prices each year, but there are no rule-of-thumb indexers.[26]

Appendix Table C1 shows that impact multipliers are almost completely unaffected by the type

[25] 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.

[26] 62% is set to approximately match the size of the first year multipliers.

of indexation, or whether prices are sticky in a conventional sense (Panel A). However, 5-year cumulative multiplier can sometimes differ.

Moving from national to local indexation generally results in almost identical 5yr aggregate cumulative multipliers, though with different drivers. For example, in both indexation regimes the largest multiplier continues to be in the Open Capital Account-Flexible ER case (0.5), with the Open Capital Account-Fixed ER case second (0.3) and the closed capital account case smallest (0.1). However, the dynamics of how the aggregate multiplier is generated is quite different. Specifically, instead of a falling spillover cumulative multiplier (as in Section 8.2), 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.[27] 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 instead we assumed standard Calvo pricing without indexation, most multipliers are similar to the baseline, with the exception of much larger fixed ER aggregate and spillover cumulative multiplier. Specifically, without indexation cumulative local multipliers after 5 years are fairly similar to the baseline at around 0.8 (vs 0.9 in the baseline). Five-year cumulative spillover and aggregate multipliers are modestly higher (between 0.1 and 0.3) than the baseline for closed capital account and open capital account-flexible ER cases. However, with a fixed ER (and open capital account) the five-year aggregate cumulative multiplier is 1.6, which much larger than the 0.3 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.[28]. Rather, the larger price distortions matter more for the output response under a fixed exchange rate than under a flexible exchange rate.

[27]For example, after 5 years the home price level is 9ppt *higher* with local indexation than national indexation. For the control region, after 5 years the size-adjusted price level is 9ppt *lower* with local indexation than national indexation.

[28]A size-adjusted 22ppts higher in the flex ER-open KA case, 18ppts higher in the fixed ER-open KA case and 10ppt high in the closed KA case

In sum, while the impact multipliers are always robust, the size and ranking of medium-run cumulative multipliers can depend on the model specifications in particular cases. Compared with the baseline, local cumulative multipliers are lower with local indexation, and spillover multipliers are higher (aggregate multipliers are unchanged). Cumulative aggregate and spillover multipliers are also much higher in a flexible ER/open capital account regime in a standard Calvo model without indexation, due to 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—the share of hand-to-mouth households, price stickiness, and home bias in consumption—directly from household and enterprise survey data.

Our model predicts a local GDP multiplier of slightly less than one: a dollar of cash transfers to the treatment region raises local output by about one dollar, with little first-year inflation. At the national level, the aggregate multiplier depends critically on the macroeconomic policy environment. When the capital account is closed, the GiveDirectly transfer—a temporary USD inflow—causes the exchange rate to appreciate, reducing export competitiveness and generating negative spillovers to the control region. In this case the aggregate multiplier is less than the local multiplier. When the capital account is open, households smooth the inflow through international bond purchases, limiting the exchange rate appreciation and producing positive spillovers. The aggregate impact multiplier is largest under an open capital account with a fixed exchange rate. As the program scales up, the local multiplier converges toward the aggregate multiplier, though the aggregate multiplier is also likely to fall as the treatment regions is less-poor on average, and hence has a lower share of HtM households. Quantitatively, village-level local estimates may substantially overstate the effects of a scaled-up program if the capital account is closed.

Taken together, our analysis suggests that cash transfers can substantially boost short-run GDP in sub-national regions receiving them, though estimates are not portable across countries or regions where the share of hand-to-mouth households, price stickiness, and home bias in consumption differ. Moreover, external-sector policy becomes increasingly important as programs scale up, with particularly negative impacts in economies with highly restricted capital flows.

Several caveats and directions for future work deserve mention. First, the model is calibrated to baseline data in Chiradzulu as the RCT is ongoing and local impact estimates are not yet available. Comparing our model's predictions against the eventual RCT estimates will provide a direct test of the model's mechanisms. Second, the supply side of the model is fairly stylized, and notably does not include measures of slack or capacity utilization as in Walker et al. (2025) or Murphy (2017). While supply-side channels in our framework play a more limited role in the short run since the multiplier is largely demand-determined when prices are sticky, they may have important effects in the longer term. Finally, Malawi's exchange rate regime involves a parallel market with a black-market premium, unbalanced trade, and external debt—complexities not captured in our baseline model. To the extent that transfer inflows generate the revaluation effects and reduce exchange rate distortions the transfers could be more expansionary than our model suggests, potentially raising the aggregate multiplier.

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Appendix A. Detailed procedure to calibrated home bias

Table A1 summarizes the consumption home bias calculation. For each pair of location and sector, we report four numbers: (i) the amount households spend per kwacha of total expenditure (¢), taken from the household survey; (ii) the probability π^v that the good is sold by a resident of a treated village; (iii) the local value-added share of that good, LC (local content); and (iv) the resulting contribution to home bias, $¢ \times \pi^v \times LC$. The rows correspond to the five shopping destinations observed in the household survey—home production, own village, another village, a market center in Chiradzulu, and Blantyre or outside the district. The columns group the 47 consumption items from the survey into food, non-food goods, and services.

Residency (π^v) and local content (LC). For all sectors, we set $\pi^v = 1$ for home production or own-village purchases and $\pi^v = 2/3$ for purchases in other villages, corresponding to the within-GVH conditional treatment rate and assuming that these purchases occur within the GVH. For purchases at the market center, we set π^v equal to the share of traders who reside in a treated village, averaged across all markets within each sector, as measured directly in the enterprise survey. We set $\pi^v = 0$ for purchases made in Blantyre or outside Chiradzulu. We define the local content share as the residual share of sales revenue after subtracting imported intermediate input costs. We compute this measure from the enterprise survey and average it across all markets within each sector. We assume that LC is uniform across locations, except for home production, for which we assign $LC = 1$.

Results. Overall, 52 cents of every kwacha of consumption accrues as income to residents of treated villages. Food is the largest expenditure category—households spend 63 cents of every kwacha on food, followed by 22 cents on services and 15 cents on non-food goods. Food is also the main contributor to home bias. Averaging across locations, about 78 cents of each kwacha spent on food accrues to treated-village residents, and about 55 cents remains as local income after adjusting for imported intermediate inputs (0.78×0.73), contributing 36 cents to total home bias.[29] Services, the second-largest expenditure category, also have a relatively large share of spending accruing to local residents (0.84), reflecting the fact that most services are purchased within the village. The services sector also has high local value added (0.67), relative to non-home-production purchases (approximately 0.5). Overall, services contribute 12 cents to total home bias. By contrast, non-

[29] This relatively high average local content is partly driven by home production, for which $LC = 1$; excluding home production, the local content of food is below 0.5.

Table A1: **Home bias by location and sector** (Cents per kwacha of total consumption)

	Food				**Non-food**				**Services**				**Total**
Location	¢	π_v	LC	HB	¢	π_v	LC	HB	¢	π_v	LC	HB	HB
Home production	24	1	1	24.0	–	–	–	–	–	–	–	–	24.0
Own village	18	1	0.47	8.5	6	1	0.50	3.0	17	1	0.67	11.4	22.9
Other village	4	$2/3^{\dagger}$	0.47	1.3	1	$2/3^{\dagger}$	0.50	0.3	1	$2/3^{\dagger}$	0.67	0.4	2.0
Market center	13	$0.32^{\S}$	0.47	2.0	4	$0.40^{\S}$	0.50	0.8	2	$0.36^{\S}$	0.67	0.5	3.3
Blantyre / outside	4	0	–	0.0	3	0	–	0.0	2	0	–	0.0	0.0
Sector total	63	$0.78^{\ddagger}$	$0.73^{\ddagger}$	35.8	15	$0.55^{\ddagger}$	$0.50^{\ddagger}$	4.1	22	$0.84^{\ddagger}$	$0.67^{\ddagger}$	12.3	**52.2**

Notes. $HB = ¢ \times \pi_v \times LC$. Home-produced food (38% of food expenditure) is assumed to be fully local ($LC = 1$). Sector-level local content shares are taken from the enterprise revenue decomposition. † Assumes households shop only within their own GVH, implying a within-treated-GVH treatment rate of 2/3. § Average across all 88 markets in the enterprise survey within each sector. ‡ Expenditure-weighted averages. Treatment of missing location: service expenditures with missing location (excluding phone and airtime) are assigned to own village, while phone and airtime are assigned to outside Chiradzulu ($LC = 0$). For food and non-food goods, expenditures with missing location are redistributed proportionally across observed shopping locations within each sector. The calculation abstracts from purchases from non-resident sellers that embody home-produced inputs.

food accounts for only 15 cents of each kwacha of expenditure and has low local content, so its contribution to overall home bias is small (4 cents).

Appendix B. Model extensions

Appendix B.1. Wage rigidities

Labor unions hire labor from both Ricardian and Non-Ricardian households with nominal wage W_t^L. Labor unions supply differentiated labor $L_t(j)$ to agency. Firm i uses aggregated labor L_t^A from the agency as follows:

$$L_t = (1-\omega) L_t^R + \omega L_t^N$$
$$\int L_t(j)\, dj = L_t$$
$$L_t^A = \left[\int L_t(j)^{\frac{\epsilon_L - 1}{\epsilon_L}} dj\right]^{\frac{\epsilon_L}{\epsilon_L - 1}}$$
$$L_t^{A,T} + L_t^{A,S} = L_t^A$$
$$\int L_t^{A,T}(i)\, di = L_t^{A,T}$$
$$\int L_t^{A,S}(i)\, di = L_t^{A,S}.$$

For generality, we assume there is nominal wage rigidity, *ala* Calvo with probability of resetting wage to be θ_W.

Appendix B.2. Variable utilization

Production function is given by

$$Y_t^T(i) = A_t^T U_t^T(i)^{\alpha_U} L_t^{A,T}(i)^{\alpha_L}, \tag{B.1}$$

where U_t^T is the variable utilization. Adopting the variable utilization for productive use is costly, so firms pay the cost for utilization described as:

$$CU^T\left(U_t^T(i)\right) = \phi_1^{CU,T}\left(U_t^T(i) - 1\right) + \frac{\phi_2^{CU,T}}{2}\left(U_t^T(i) - 1\right)^2, \tag{B.2}$$

where $\phi_1^{CU,T}, \phi_2^{CU,T} > 0$ are parameters, so the utilization cost function is positive and has positive first and second derivatives. This specification of utilization costs is to capture costs associated with changing hours worked or technology adoption, and it is a real cost in terms of firm's own sectoral output. The variable utilization feature in our model is commonly modeled in macroeconomics as it helps the model to match salient features of the data, see for example the recent work by Klein and Linnermann (2024). In addition, it is consistent with the case of Malawi, where the baseline enterprise survey suggests that market sellers change their working hours (store opening hours) in response to demand shocks.

Appendix C. Additional Figures and Tables

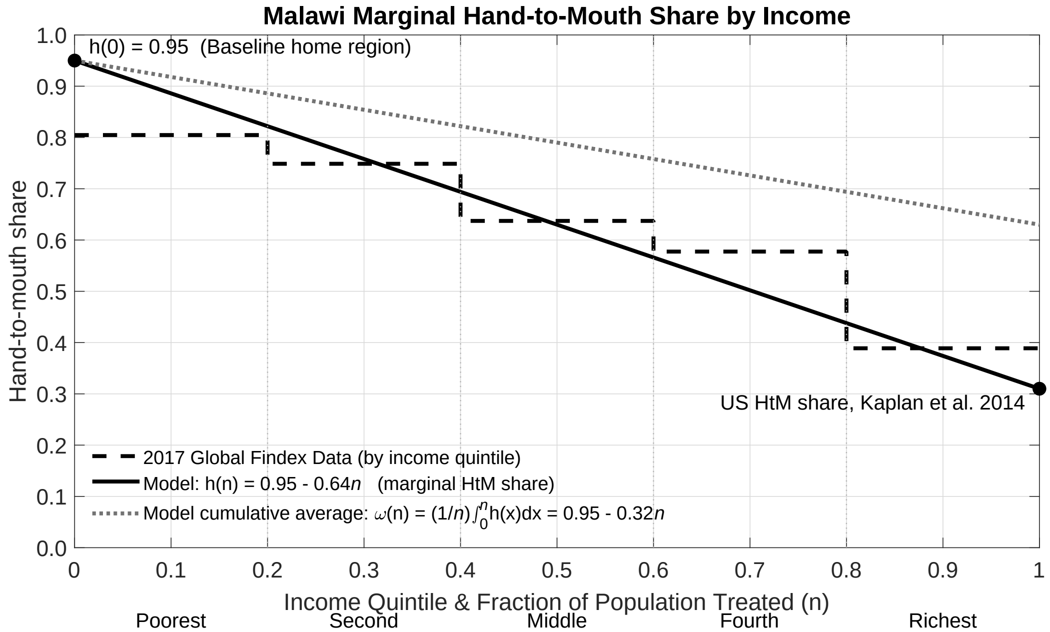

Figure C1: Marginal Hand-to-Mouth share by income in Malawi. Step function: 2017 Global Findex data by income quintile. Solid line: linear marginal density $h(n) = 0.95 - 0.64\,n$ used in the model. Dotted line: implied cumulative average $\omega(n) = (1/n)\int_0^n h(x)\,dx = 0.95 - 0.32\,n$.

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	0.9	0.9	0.9	0.9	0.1	0.8
Closed KA, Flexible ER	Spillover	-0.4	-0.4	-0.4	-0.8	0.0	-0.6
Closed KA, Flexible ER	**Aggregate**	**0.5**	**0.5**	**0.5**	**0.1**	**0.1**	**0.2**
Open KA, Flexible ER	Local	0.9	0.9	0.9	0.9	0.1	0.8
Open KA, Flexible ER	Spillover	0.5	0.5	0.4	-0.4	0.4	-0.1
Open KA, Flexible ER	**Aggregate**	**1.4**	**1.4**	**1.3**	**0.5**	**0.5**	**0.7**
Open KA, Fixed ER	Local	0.9	0.9	0.9	0.9	0.1	0.8
Open KA, Fixed ER	Spillover	0.9	0.9	0.9	-0.6	0.2	0.8
Open KA, Fixed ER	**Aggregate**	**1.8**	**1.8**	**1.8**	**0.3**	**0.3**	**1.6**

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

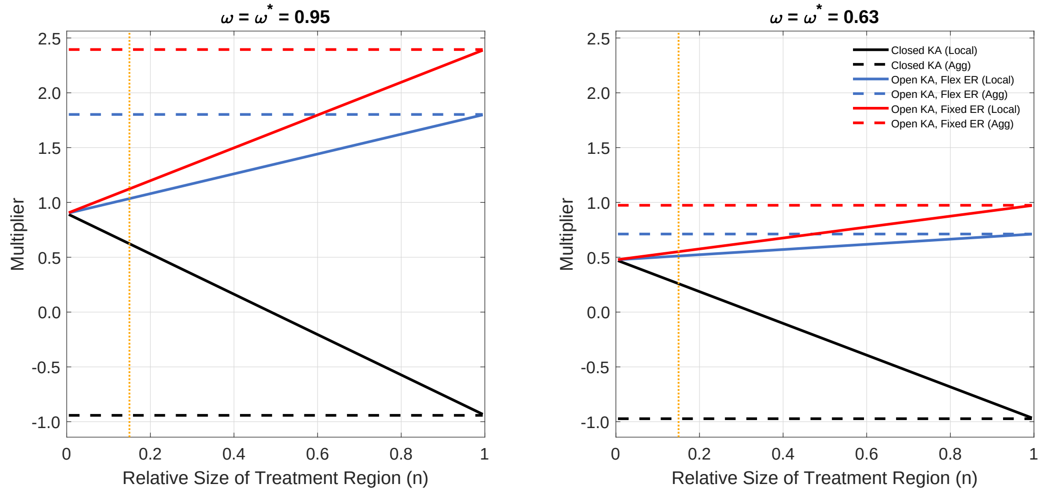

Figure C2: Local and aggregate output multipliers as the treatment region scales up, under symmetric hand-to-mouth (HtM) shares ($\omega = \omega^*$)

Notes: Each panel plots the local (solid) and aggregate (dashed) output multipliers of an unconditional cash transfer, 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 $n = 0.15$.

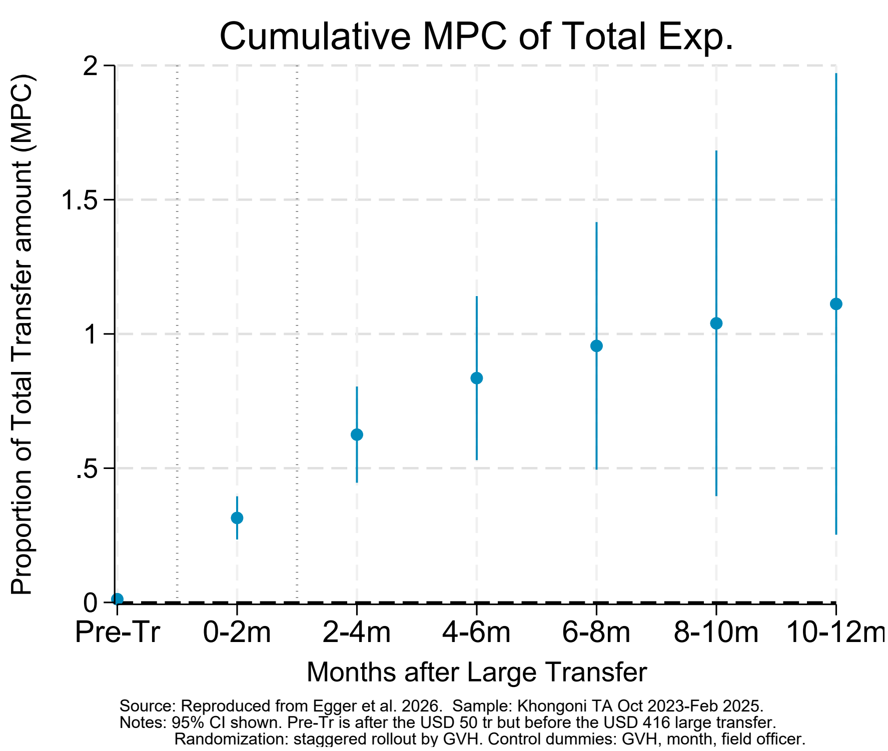

Figure C3: MPC to spend one-time transfers in Khongoni subdistrict from Egger et al (2026)

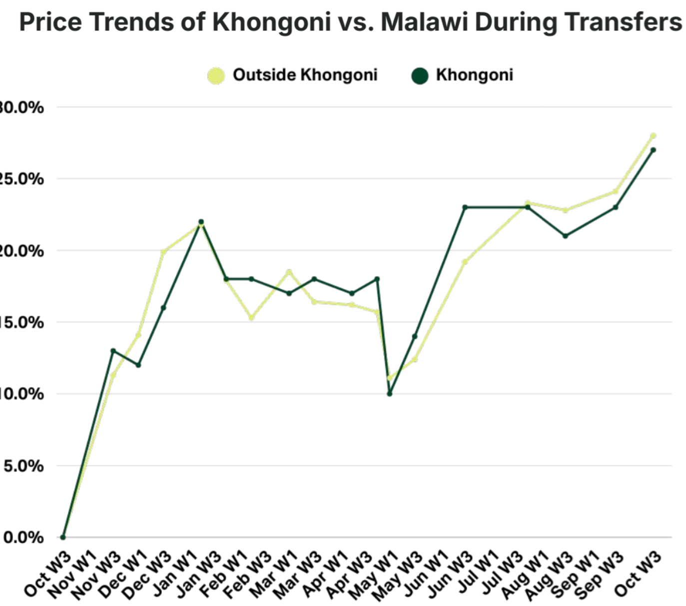

Figure C4: Price trends in response to one-time transfers in Khongoni subdistrict from Egger et al (2026)

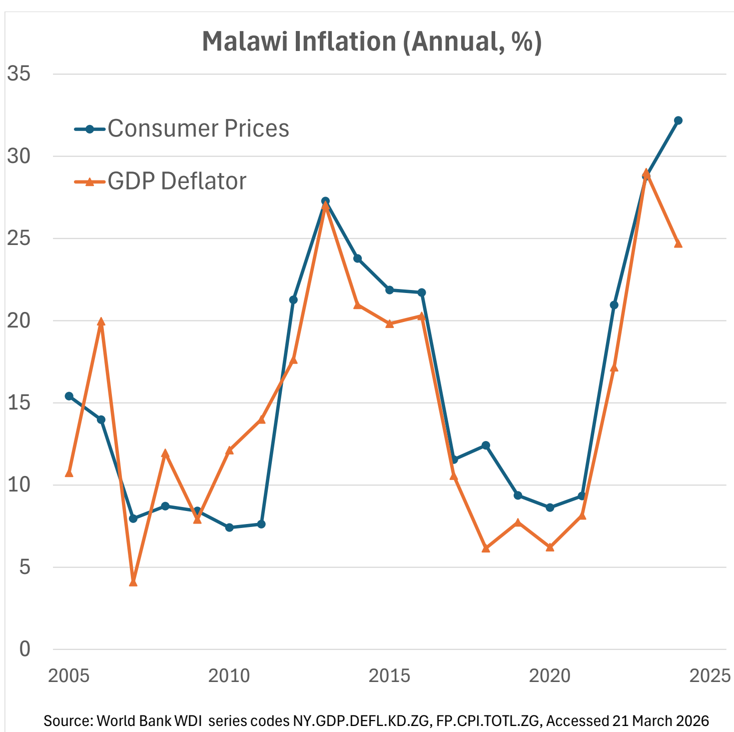

Figure C5: Inflation in Malawi