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The Distributional Consequences of Commodity Booms

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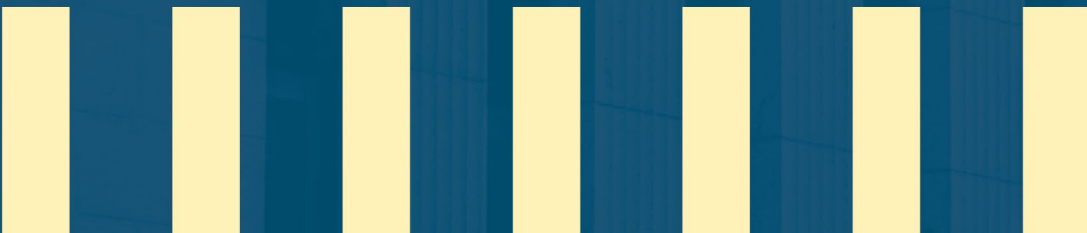
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The Distributional Consequences of Commodity Booms^{*}

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Abstract

This paper examines the response of income inequality to commodity price shocks and identifies the underlying mechanisms at play. I provide novel cross-country evidence from commodity-exporting nations, showing that positive commodity price shocks reduce labor income inequality between skilled and unskilled workers. This reduction in inequality is primarily driven by a fall in the skill premium, arising from the expansion of unskilled-labor-intensive sectors, such as construction, which grow more rapidly than skilled-labor-intensive ones, such as services. To interpret these results, I develop a quantitative multisector small-open-economy model that incorporates sectoral heterogeneity in both skilled-labor intensity and sensitivity to commodity price shocks. I use the model as a laboratory to explore the distributional impacts of various policy responses to commodity windfalls, demonstrating how saving or spending these gains can either reinforce or moderate the reduction in inequality. This analysis provides new insights into the broader economic and social impacts of commodity price shocks in emerging markets.

Keywords: Commodity prices; Income inequality; Dutch Disease.

JEL Codes: E32, F41, J30, Q33.

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1. Introduction

Commodity price shocks present significant challenges for policymakers in commodity-exporting economies. A large body of research has examined the macroeconomic effects of these shocks, including how they propagate through the economy and the appropriate responses to manage their impact (Schmitt-Grohé and Uribe, 2018; Fernández et al., 2018; Drechsel and Tenreyro, 2018). Relatively little, however, is known about their potential distributional impact. Given the high and persistent levels of income inequality in commodity-dependent economies (e.g. Stiglitz, 2007, Williamson, 2015), understanding how these shocks affect the distribution of income becomes a first-order question from a policy perspective.

This paper sheds light on how labor income inequality responds to commodity price shocks and identifies the underlying mechanisms at play. I proceed in three steps. First, I provide novel cross-country evidence showing that labor income inequality between skilled and unskilled workers—the *labor income gap*—declines following positive commodity price shocks in commodity-exporting economies. Second, using detailed sectoral level data, I show that the reduction in income inequality is primarily driven by a fall in the skill premium, arising from the expansion of unskilled-labor-intensive sectors, such as construction, which grow more rapidly than skilled-labor-intensive ones, such as services. Finally, I incorporate this mechanism into a multisector small open economy (SOE) model with household heterogeneity, which I use to quantify the distributional implications of these shocks and to evaluate the role of alternative government policies in shaping these outcomes.

It is not obvious, *ex ante*, whether commodity booms increase or reduce income inequality. On the one hand, because these are sectoral shocks, it is natural to anticipate that the main beneficiaries of a favorable price change might be the workers directly employed by commodity-producing sectors. The strength of this effect, however, depends on the amount of labor employed in these sectors. In this paper, I focus on commodity exporters specializing in metals or energy, sectors that employ a small share of the overall labor force. As a result, the direct employment effects within the commodity sectors are limited. On the other hand, these sectors are significant enough in terms of GDP to generate sizable national wealth

effects, leading to increases in aggregate income that spill over to the rest of the economy. Whether these shocks increase or decrease inequality depends on which sectors benefit from these wealth effects and who works in them. In simple models, these wealth effects lead to an expansion of the nontraded goods sector which tends to be dominated by relatively high skilled workers. My proposed mechanism differentiates between nontraded services and nontraded construction. Consistent with the empirical evidence, it is the impact of commodity booms on construction that drives the reduction in inequality.

I begin by empirically analyzing the effects of commodity price shocks in a sample of Latin American commodity exporters specializing in metals or energy, covering the period 1992–2019. Using a panel local-projection design, I establish three key findings. First, these shocks are expansionary, triggering investment booms, real exchange rate appreciations, and reductions in interest rate spreads—findings consistent with the literature. Second, commodity price shocks lead to a decline in labor income inequality between skilled and unskilled workers—a novel contribution to the limited research on the distributional effects of commodity booms. Finally, I provide suggestive evidence of a novel mechanism operating outside the commodity sector. Commodity booms lead to a reallocation of production toward nontradables, disproportionately benefiting unskilled-labor-intensive sectors such as construction, which experience significantly more growth compared to skilled-labor-intensive sectors such as services.

Motivated by these stylized facts, I develop a quantitative, multisector SOE model to examine the distributional effects of commodity price shocks. The model features tradables, nontradables, and a commodity sector treated as an endowment fully exported at an exogenous price. I enrich this setting with two key ingredients. First, I introduce heterogeneous workers, distinguishing between skilled and unskilled labor, to capture labor income inequality. For simplicity, workers live hand-to-mouth, while a single capitalist owns all assets—including the commodity endowment—and manages all saving and borrowing decisions. Second, I divide the nontradable sector into services and construction to capture their distinct responses to a commodity price shock. These sectoral differences play a critical role in shaping inequality dynamics since they employ skilled and unskilled workers with differ-

ent intensities. Finally, I incorporate two additional elements to capture standard features of commodity-exporting economies: a government that appropriates a share of commodity revenues through taxation and allocates them to public spending, transfers, or savings in a sovereign wealth fund; and an interest rate that is sensitive to commodity price fluctuations, capturing common financial frictions in emerging economies.

Qualitatively, the direction of the labor-income-inequality response to a commodity price shock depends on how sectors with different skill intensities react to such a shock. In both the model and the data, services are the most skilled-labor-intensive sector, while construction is the most intensive in unskilled labor. The tradable sector lies in between, less skill-intensive than services but more skill-intensive than construction. A positive commodity price shock triggers an exchange rate appreciation, leading to a contraction in the tradable sector and an expansion in nontradables. However, within the nontradable sector, construction booms while services experience milder growth. Labor income inequality declines when the expansion in construction is large enough to offset the contraction in the tradable sector (which employs a significant number of unskilled workers) and the growth in services (which benefits skilled workers).

While the relative expansion of the nontradable sector vis-à-vis the tradable sector follows from standard Dutch-disease arguments ([Corden and Neary 1982](#)), capturing the heterogeneous responses within the nontradable sector itself requires a clear rationale for why different subsectors react differently to the same aggregate shock.¹ In the model, I incorporate the data-supported assumption that services and construction serve as inputs for distinct final goods: services contribute to consumption goods and construction contributes to investment goods. Since commodity booms trigger investment surges, they lead to a large

¹In their seminal paper, [Corden and Neary \(1982\)](#) introduce the term “Dutch disease” to refer to the negative economic consequences that can arise when a country experiences a boom in one sector, typically due to the discovery or exploitation of natural resources (such as oil or minerals). The authors divide an economy experiencing an export boom into three sectors: the booming commodity sector and the lagging export sector, both of which are tradable-goods sectors; and the nontradable-goods sector. The influx of wealth from the resource sector leads to an appreciation of the domestic currency, making the country’s other export sectors (such as manufacturing or agriculture) less competitive internationally. At the same time, resources (capital and labor) shift toward the booming resource sector and nontradable sectors such as construction or services, leaving the tradable sector underdeveloped.

expansion in construction, further boosting wages and labor demand for unskilled workers.

To analyze the model’s quantitative predictions, I parameterize it to match key steady-state features of my sample of Latin American countries and estimate a subset of parameters by matching the model’s impulse responses to their empirical counterparts. The model successfully replicates the dynamics of the labor income gap and the differential responses of the tradable, services, and construction sectors—all untargeted moments.

Then, I use the model as a laboratory to evaluate the distributional implications of alternative policy responses to commodity windfalls. In the baseline economy, the government taxes the capitalist’s commodity income and allocates all revenue to public consumption. I then consider two departures from this baseline, both inspired by policies implemented in commodity-exporting economies.²

The first experiment studies the effect of redistributing the windfall away from the capitalist through a higher tax rate on its commodity revenue. Under this policy, a positive commodity price shock leads to a more moderate decline in labor income inequality. Since the government spends contemporaneously while the capitalist is the only agent accumulating capital, this policy redirects resources away from investment and toward consumption, leading to a smaller boom in construction and a more significant expansion in services. I also show that the effects on labor income inequality are virtually unchanged whether the additional revenue is spent by the government or transferred as lump sums to workers.

The second experiment studies the effect of saving the bulk of the commodity windfall in a sovereign wealth fund (SWF). Accumulating assets in the SWF improves the economy’s consolidated external position, reducing the country risk premium. Lower borrowing costs stimulate private investment, amplifying the expansion of the construction sector and reinforcing the compression of labor income inequality. As a result, the decline in labor income inequality following the shock is amplified.

Taken together, the two experiments show that how the commodity windfall is allocated shapes its distributional consequences. Policies that redirect commodity revenue away

²See [Frankel \(2010\)](#) for a detailed discussion of policies that have been implemented in resource-rich economies.

from the capitalist dampen the investment response and moderate the fall in labor income inequality. Policies that save the windfall and reduce borrowing costs amplify it.

Finally, I conduct a series of robustness checks to validate the baseline results and extend the analysis to a broader set of commodity-exporting economies, confirming that the findings generalize beyond the original sample.

Literature. This paper is related to three strands of the literature. First, it contributes to the literature on the effects of terms-of-trade shocks ([Mendoza 1995](#); [Kose 2002](#); [Schmitt-Grohé and Uribe 2018](#)) and, particularly, the effects of commodity price shocks in SOEs ([García-Cicco and Kawamura 2015](#); [Shousha 2016](#); [Fernández et al. 2018](#); [Drechsel and Tenreyro 2018](#); [Alberola and Benigno 2017](#)). This body of research has made progress in quantifying the macroeconomic impacts of these shocks, including how they propagate through the economy, their role in business cycle fluctuations, and the appropriate policy responses. Relatively little attention, however, has been given to their potential distributional effects. I contribute to this literature by providing new evidence and developing a quantitative model that addresses the underexplored link between commodity price shocks and labor income inequality. I further evaluate the role of alternative policy responses in shaping the distributional consequences of commodity windfalls.

Second, my paper relates to the broader literature on the distributional effects of external shocks ([Goldberg and Pavcnik 2007](#); [Topalova 2010](#); [Helpman et al. 2010](#); [Autor et al. 2013](#); [Adão 2015](#); [Cravino and Levchenko 2017](#); [Blanco et al. 2024](#); [Aldunate et al. 2024](#); [Benguria et al. 2024](#); [Broer et al. 2025](#)). The paper most closely related to mine is [Benguria et al. \(2024\)](#), who find that positive commodity price shocks reduced the skill premium in Brazil, a large commodity exporter, during the 2000s. They focus, however, on a mechanism operating directly through the commodity sector, which employs a significant portion of the workforce in their context. I instead focus on economies where the commodity sector employs a small share of the labor force and propose a distinct mechanism that operates entirely outside it. In particular, I explore the differential expansion of construction and services within the nontradable sector — the former unskilled-intensive, the latter skilled-intensive — which is

the key driver of the reduction in labor income inequality.

Third, this paper contributes to the literature on the resource curse, particularly the Dutch disease phenomenon (Corden and Neary 1982; Corden 1984; Wijnbergen 1984; Krugman 1987; Sachs 1995; Torvik 2001). I use this theory as a starting point to examine how the reallocation of production and resources across sectors triggered by a commodity boom affects labor income inequality. I show that when the canonical Dutch-disease model is calibrated with plausible assumptions about skilled-labor intensity across sectors, it predicts a positive relationship between commodity booms and income inequality.³ This prediction contrasts with the empirical evidence I present in this paper, which indicates a negative relationship. To reconcile this tension, I extend the framework to account for heterogeneity within the nontradable sector. I demonstrate that a model distinguishing between services and construction is crucial for understanding how commodity price shocks affect labor income inequality.⁴ To the best of my knowledge, this is the first model in this literature to assign distinct roles to services and construction within the nontradable sector. This paper also contributes to the empirical Dutch disease literature, which has primarily focused on the divergence between tradable and nontradable sectors (Spatafora and Warner 1995; Sachs and Warner 2001; Sala-i Martin and Subramanian 2013; Magud and Sosa 2013) by providing evidence of heterogeneous dynamics within the nontradable sector itself.⁵

Outline. The rest of the paper is organized as follows. Section 2 presents evidence of the main empirical regularities that characterize episodes of favorable change in commodity prices with a focus on the link between them and labor income inequality. Section 3 presents the model. Section 4 describes the parameterization of the model, validates its predictions against the data, and analyzes the mechanism through which commodity booms reduce labor

³Galiani et al. (2010) show that this theoretical result is also plausible in a Heckscher-Ohlin-Samuelson (HOS) model with a non-tradable sector and skilled/unskilled labor.

⁴The model also speaks to the literature on the financial resource curse (Benigno and Fornaro, 2014), where capital inflow surges generate an expansion of the nontradable sector at the expense of tradables. My framework, by distinguishing construction from services within the nontradable sector, identifies the construction boom as the operative margin of that expansion.

⁵An exception is Bjørnland and Thorsrud (2016), who analyze productivity spillovers from the booming sector to other domestic sectors.

income inequality. Section 5 evaluates the distributional implications of alternative policies for allocating commodity windfall revenue. Finally, Section 6 concludes.

2. Empirical Evidence on Commodity Booms

This section provides descriptive evidence about the empirical regularities that characterize favorable changes in commodity prices for a sample of commodity-exporting countries. First, I corroborate the finding that commodity price shocks are an important source of business cycle fluctuations in these countries. Second, I document a negative correlation between commodity booms and labor income inequality. Finally, I show that following favorable changes in commodity prices, there is an expansion led by unskilled-labor-intensive sectors. Section 2.1 presents my sample and the main data sources. Section 2.2 discusses the empirical model. Section 2.3 presents the results. Section 2.4 performs a series of additional exercises to ensure the validity of the results.

2.1. Data, Sample and Definitions

Sample. I focus on a sample of six Latin American countries from 1992 to 2019: Bolivia, Chile, Colombia, Ecuador, Mexico, and Peru. Latin America is a suitable region for studying my topic for a few reasons. First, it is the most unequal region in the world in terms of income, making the topic highly relevant to public policy. Second, during the 2000s, the region experienced a commodity boom that coincided with a fall in income inequality; since then, academics and policy analysts have investigated whether these events were related.⁶ Finally, the availability of harmonized microdata across these countries allows for a reliable comparison of inequality measures between them without major concerns.

These countries have some common features worth mentioning (see Table 1). First, commodities represent a large share of their total exports. Second, their export profile is biased toward metals and energy commodities (ME) such as gold, copper, coal, and oil;

⁶See López-Calva and Lustig (2010); Gasparini et al. (2011); Lustig et al. (2016); Messina and Silva (2021).

ME represents, on average, more than 73% of their total commodity exports.⁷ Third, these sectors are large in terms of GDP (with an average share close to 10%) but employ a small share of the labor force (less than 2% on average). These features make this sample well suited to study the indirect, general equilibrium channels through which commodity booms affect labor income inequality: since direct employment in the commodity sector is limited, the main transmission mechanisms likely operate outside it.⁸

Table 1: COMMODITY DEPENDENCE AND SIZE: SUMMARY STATISTICS FOR SAMPLE COUNTRIES

Country	(1)	(2)	(3)	(4)
	Commodities (% of total exports)	ME Commodities (% of total Commodity exports)	Employment in ME (% of total employment)	ME Commodities (% of GDP)
Bolivia	92.2%	75.0%	1.7%	11.1%
Chile	85.9%	76.2%	1.8%	11.6%
Colombia	70.7%	71.1%	1.1%	8.9%
Ecuador	91.9%	56.1%	1.5%	7.3%
Mexico	25.8%	88.9%	0.5%	6.8%
Peru	87.3%	76.2%	1.0%	10.1%
Average	75.6%	73.9%	1.3%	9.3%

Notes: This table presents some key summary statistics for the countries included in my sample. Column (1) shows the share of all commodities in total exports. Column (2) shows the share of metals and energy (ME) commodities in total commodity exports. Column (3) shows the share of employment in ME commodities in the total labor force. Column (4) shows the value added of ME commodities as a share of GDP. Values for each country are averages for the period 1992–2019.

Commodity prices. Since the study countries specialize in metals or energy commodities, I construct country-specific commodity price indexes that only include these goods, following standard practices in the literature (see [Shousha 2016](#), [Fernández et al. 2018](#), or, more recently, [Gruss and Kebhaj 2019](#)). Commodity price index $P_{i,t}^{Co}$ for country i in period t is

⁷Appendix A gives a detailed list of the 13 commodities that fall into this category. To give some sense of the export profile of these countries, in Appendix Table B.1 I list their largest export commodities as a share of total commodity exports.

⁸There are other major commodity exporters in Latin America – Argentina, Brazil, Paraguay, and Uruguay – whose commodity sectors employ a large share of the labor force, explained in part by their specialization in agricultural commodities. For these countries, the mechanism highlighted by [Benguria et al. \(2024\)](#), operating directly through the commodity sector, might be more suitable. In Appendix Figure B.20, I show that labor income inequality also falls following positive commodity price shocks in a broader sample that includes these countries.

defined as follows:

$$P_{i,t}^{Co} = \sum_{j=1}^N \Omega_{i,0}^j P_t^j$$

Here, P_t^j is commodity j 's real USD price in world markets at time t and $\Omega_{i,0}^j$ represents its weight for country i . The weights are computed as the ratio of country i 's exports of commodity j to total commodity exports at the beginning of the sample using UN Comtrade data. I take P_t^j from the International Monetary Fund's Primary Commodity Price Database, which provides nominal price indices, and deflate them by the unit value index for manufacturing exports (MUV index).

Labor income inequality measure. For my labor income inequality measure I use the Socio-Economic Database for Latin America (SEDLAC), which relies on household surveys to generate statistics about labor income, education level, and other social indicators for Latin American countries. The main feature of this dataset is that all the indicators provided are constructed following the same methodology in all countries, which allows for a reliable comparison among them over time.⁹ My main measure of labor income inequality is the *labor income gap*, which I define as the ratio of the average labor income of skilled (or high-skilled) workers (y_t^H) to the average labor income of unskilled (or low-skilled) workers (y_t^L):¹⁰

$$\eta_t = \frac{\text{Skilled labor income } (y_t^H)}{\text{Unskilled labor income } (y_t^L)}$$

Labor income is measured after taxes and does not include government transfers. I choose this measure to be consistent with the measure that I use below in the quantitative model.¹¹ In Appendix Table B.2, I show high comovement between this measure and alternative measures of income inequality such as the Gini coefficient and the ratio of the

⁹A detailed description of the database and variable definitions can be found in Appendix A.

¹⁰Throughout the paper, I use labor income or labor earnings as equivalent terms. This measure of inequality has been used in other works; see Giarda (2021, 2023).

¹¹Labor income is also the main component of total individual income in Latin America. For the countries in my sample, it represents around 85% of total income on average, with capital income and government transfers accounting for only around 3.5% and 1%, respectively (see Gasparini et al. 2011).

90th percentile to the 10th percentile, among others. Skilled workers are defined as those who have at least completed high school, while unskilled workers are those who have not completed high school. Using this measure, I arrive at a balanced sample between the two groups.¹²

Aggregate data. Data on GDP, consumption, and investment are expressed in constant prices in local currency units. The real exchange rate is constructed using the nominal exchange rate (measured in units of local currency per US dollar), the domestic consumer price index, and the US consumer price index. All these data come from the International Monetary Fund’s International Financial Statistics Dataset. I use the country-specific J.P. Morgan’s Emerging Market Bond Index (henceforth, EMBI) as a proxy variable to measure country credit spreads in emerging markets; the data are from Bloomberg.

Sectoral data. I take real value added in each sector from national accounts of each country. Additionally, for each country and sector, the SEDLAC database allows me to observe the fraction of total workers that are skilled or unskilled. Based on this database, I define a sector’s skilled-labor intensity as the share of skilled workers relative to total workers in that sector.¹³

2.2. Empirical Specification

I now provide descriptive evidence to characterize the response of key variables to changes in commodity prices by estimating local projections in the style of [Jordà \(2005\)](#). My empirical model is closest to that in [Gruss and Kebhaj \(2019\)](#) and [Gazzani et al. \(2024\)](#). Identification

¹²This definition yields a balanced sample between skilled and unskilled workers, with the former representing around 46% of the working population on average (Appendix Table B.3). In a robustness exercise, I replace this definition with “some college or more” and show that the results are virtually unchanged.

¹³I classify sectors according to ISIC-4: agriculture & fishing, mining, manufacturing, utilities, construction, commerce, hotels & restaurants, transport & communication, finance, business, public administration, teaching, health, and others. For each country, I define skill intensity in sector s as $SI_s = \sum_j \omega_j^s \left(\frac{H_j}{H_j + L_j} \right)$, where $\omega_j^s = n_j^s / n^s$ is the employment share of subsector j within sector s , H_j and L_j are the number of skilled and unskilled workers in subsector j , and $H_j / (H_j + L_j)$ is the share of skilled workers among all workers in subsector j .

rests on the assumption that the commodity price index is predetermined with respect to domestic conditions, which is standard in the small open economy literature (see, for example, [Mendoza 1995](#); [Schmitt-Grohé and Uribe 2018](#)).¹⁴ I make two small departures from the existing literature: first, I analyze commodity price shocks that arise only because of changes in metals or energy commodities; second, I use measures of labor income inequality as outcome variables.

I estimate equations of the following form:

$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \phi T + \beta^h p_{i,t}^{Co} + \mathbf{X}_{i,t}' \boldsymbol{\gamma}^h + \epsilon_{i,t+h}, \quad (1)$$

where y is a variable of interest; $p_{i,t}^{Co}$ is my measure of the commodity price shock, defined as the cyclical component of the commodity price index for country i in period t , obtained by removing a country-specific quadratic time trend;¹⁵ α_i^h is a country fixed effect that controls for permanent differences across countries; T is a linear time trend included to account for nonstationary outcome variables;¹⁶ $\mathbf{X}_{i,t} = (p_{i,t-1}^{Co}, \dots, p_{i,t-J_p}^{Co}, \Delta y_{i,t-1}, \dots, \Delta y_{i,t-J_y})'$ collects the J_p lags of the commodity price index and the J_y lags of the first-differenced outcome variable, with $\boldsymbol{\gamma}^h$ the corresponding vector of coefficients; and $\epsilon_{i,t+h}$ is the residual at horizon h .

This specification is estimated by ordinary least squares for each horizon h . The main coefficient of interest is β^h , which measures the cumulative growth of variable y , h years after a change in the commodity price index. I assume that the coefficients are common across

¹⁴A potential concern is that Chile, as a dominant copper exporter, may influence global copper prices. However, [Gruss and Kebhaj \(2019\)](#) find no evidence — even among large or market-dominant commodity exporters — that domestic developments Granger-cause movements in commodity terms of trade. Additionally, the estimates are essentially unchanged when Chile is excluded (see Appendix Figure [B.19](#)).

¹⁵ Since the quantitative model I develop in Section [3](#) is stationary, I use the cyclical component of the commodity price index as the empirical counterpart to the model shock. This is standard practice in the literature (see [Shousha 2016](#); [Schmitt-Grohé and Uribe 2018](#); among others). In a robustness exercise in Appendix [B.3](#), I use alternative filters — a linear trend and the HP filter — and the results are unchanged.

¹⁶Rather than detrending the outcome variables prior to estimation, I include the trend directly in the regression, allowing the data to jointly determine the weight assigned to long-run factors alongside the commodity price shock. As [Ramey \(2016\)](#) discusses in the context of local projections, pre-detrending the dependent variable is a special case of this approach and can introduce distortions when the trend specification is uncertain, because it imposes the restriction that the trend is orthogonal to the regressors. An alternative approach — detrending $y_{i,t}$ before estimation — yields virtually identical results.

countries, i.e., I compute a pooled estimator to obtain an average effect. Standard errors are computed following [Driscoll and Kraay \(1998\)](#), which are robust to heteroskedasticity, serial correlation within countries, and cross-sectional dependence across countries — a relevant concern given that commodity price shocks may simultaneously affect multiple countries in the sample. In the baseline specification, I set $J_p = J_y = 2$.

2.3. Evidence on Commodity Booms

This section presents three key findings on the empirical patterns that emerge from favorable changes in commodity prices in commodity-exporting countries. First, I show that commodity booms are expansionary, leading to surges in investment, real exchange rate appreciation, and a narrowing of interest rate spreads. Second, I document a novel finding: Labor income inequality declines following commodity price shocks. Finally, I provide suggestive evidence of a potential mechanism driving this reduction in inequality. Specifically, commodity price shocks have heterogeneous effects across sectors, disproportionately benefiting unskilled-labor-intensive industries, such as construction, which experience stronger growth compared to skilled-labor-intensive industries, such as services.

Fact 1: Macroeconomic effects around Commodity Booms

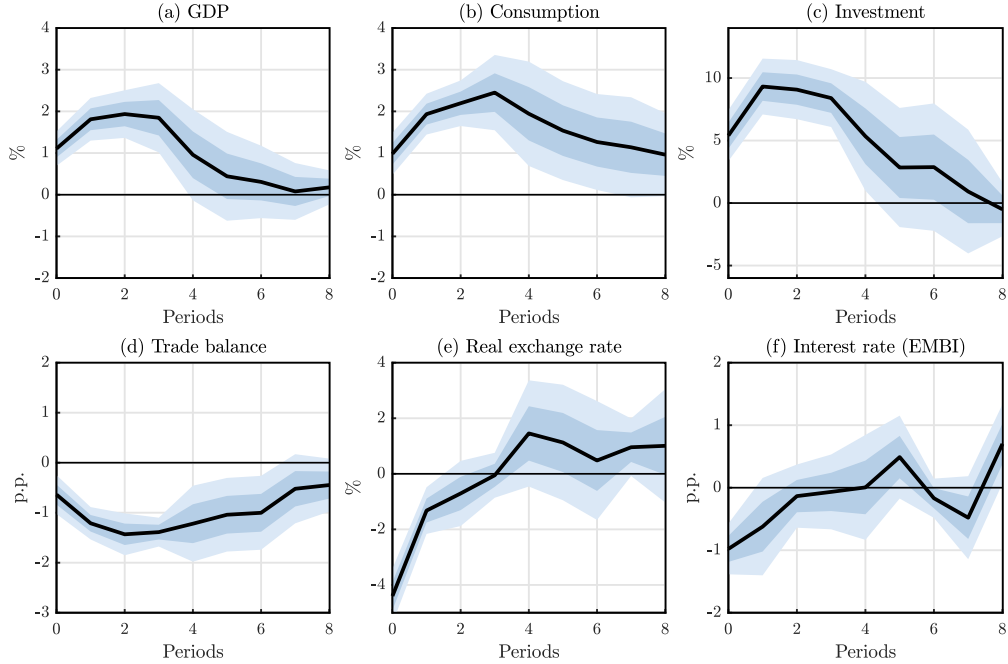
Figure 1, panels (a)–(f) show the response of key macroeconomic variables to a 10% increase in commodity prices, obtained by estimating equation (1). For the sample of countries considered, a 10% increase in $p_{i,t}^{Co}$ corresponds to a shock of approximately one standard deviation. The black solid lines depict the estimates of β^h for different horizons h , while shaded areas represent 68% and 90% confidence intervals. The results show persistent, statistically and economically significant positive responses of output, consumption, and investment. Investment displays the largest response, peaking at around 10% within two years of the shock—far exceeding the responses of GDP and consumption, which remain around 2%. (see [Shousha, 2016](#); [Fernández et al., 2017](#); [Schmitt-Grohé and Uribe, 2018](#)).

The total trade-balance to GDP ratio is negative on impact, consistent with [Drechsel](#)

and Tenreyro (2018) and Gazzani et al. (2024).¹⁷ There is also a marked real exchange rate appreciation, as expected following an expansionary commodity boom.

Finally, there is a significant and negative response of interest rate spreads: A 10% increase in commodity prices generates a fall in spreads of around 1 percentage point on impact. This result confirms previous findings highlighting the existence of strong negative comovement between commodity prices and interest rate spreads (see Bastourre et al. 2012, Shousha 2016, Drechsel and Tenreyro 2018). If the spread falls during a commodity boom, then there is an additional source of amplification of the shock on the aggregate economy.

Figure 1: MACROECONOMIC DYNAMICS AROUND COMMODITY BOOMS



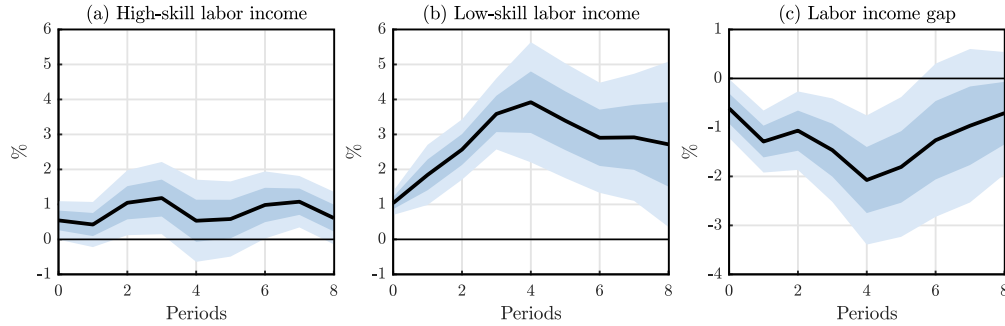
Notes: This figure plots the response of (a) GDP, (b) consumption, (c) investment, (d) trade-balance to GDP ratio, (e) real exchange rate, and (f) EMBI to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals. All variables are expressed in log differences except for the trade balance to GDP ratio and the EMBI, which are expressed in absolute differences.

¹⁷The countercyclical response of the trade balance contrasts with the predictions of standard SOE models (Mendoza, 1995; Schmitt-Grohé and Uribe, 2018), where positive terms of trade shocks tend to improve the trade balance. Drechsel and Tenreyro (2018) show that this pattern arises when the expansion in domestic absorption is sufficiently large.

Fact 2: Commodity Booms reduce labor income inequality

While the macroeconomic effects of commodity price fluctuations have been widely studied, their potential distributional impacts remain less understood. This study attempts to fill this gap. Figure 2 illustrates the dynamics of real labor income for high- and low-skilled workers to a 10% increase in commodity prices. Both groups experience income growth, but the income of unskilled workers rises twice as much on impact and continues to increase over the first four years. This divergence leads to a cumulative reduction in the labor income gap of 2.1% four years after the shock.

Figure 2: LABOR INCOME DYNAMICS AROUND COMMODITY BOOMS



Notes: This figure plots the response of (a) high-skill real labor income, (b) low-skill real labor income, and (c) the labor income gap ($\frac{y^H}{y^L}$) to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals. All variables are expressed in log differences.

These responses are substantial, especially considering the inherent volatility of commodity prices and their tendency to experience significant fluctuations. For instance, under price increases similar to those seen during the 2000s commodity boom—when the detrended component of the commodity price index rose by around 30% for the average country in my sample—the baseline results indicate a reduction in labor income inequality of around 6.3%, four years after the shock.

To gain further insight into whether the observed reduction in labor income inequality stems from shifts in relative wages, hours worked, or both. Appendix Figures B.1 and B.2 display the separate responses of wages and hours worked for each worker type to a positive commodity price shock. I find that the decline in labor income inequality is almost entirely

driven by the skill premium: wages of unskilled workers expand at a higher rate than those of skilled workers, while hours worked show no economically meaningful differential response across skill groups. These results align with studies attributing a preponderant role to the skill premium in accounting for the fall in labor income inequality observed in Latin America during the 2000s (see [López-Calva and Lustig, 2010](#); [Gasparini et al., 2011](#); [Azevedo et al., 2013](#); [Rodríguez-Castelán et al., 2016](#); [Benguria et al., 2024](#), among others).

It is also worth noting that the labor income inequality measure used here is inherently conservative. When alternative inequality measures, such as the income ratios of the 90th to 10th or 95th to 5th percentiles, are applied, the estimated effects nearly double. A similar conclusion is reached when considering the Gini coefficient, which exhibits a cumulative reduction of around 1.5 percentage points in response to a 10% increase in commodity prices five years post-shock (see [Figure B.3](#)). The results are also robust to the definition of skilled workers: restricting the skilled group to college graduates generates virtually no changes (see [Appendix Figure B.4](#)). In what follows, I provide suggestive evidence on the potential forces linking positive commodity price shocks with changes in labor income inequality.

Fact 3: Commodity booms lead to booms in unskilled-labor-intensive sectors

As I documented above, commodity sectors employ only a small fraction of the total labor force in the economies in my sample (see [Table 1](#)). Understanding how the other sectors are affected by commodity price shocks and who works in these sectors is essential to understand the consequences for labor income inequality. I start by dividing the noncommodity part of the economy into two types of sectors: tradable and nontradable.¹⁸

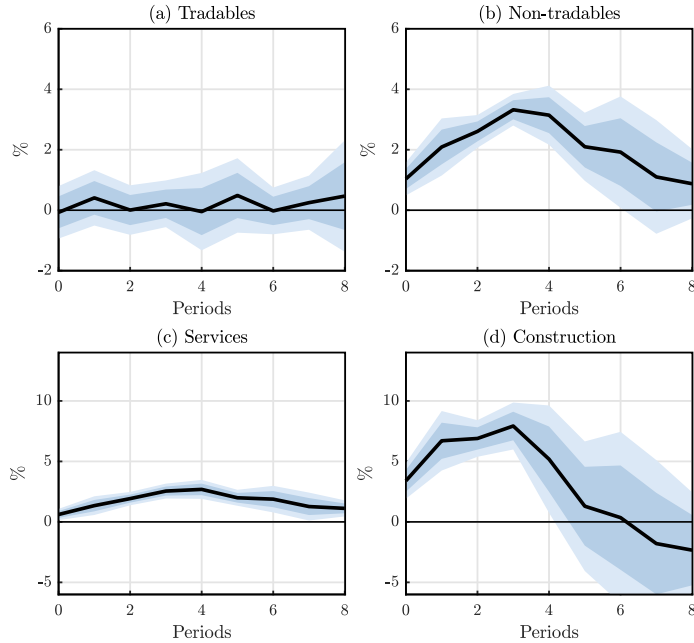
[Figure 3](#), panels (a)–(b) show that following a favorable change in commodity prices, there is a relative expansion in the output of the nontradable sector vis-à-vis the tradable sector. This behavior can be interpreted through the lens of the Dutch-disease framework. A boom in the commodity sector triggers an increase in national income and a rise in spending on all goods. While traded goods can be bought abroad, the increased demand

¹⁸Tradables include agriculture and manufacturing; nontradables include construction, utilities, commerce, hotels & restaurants, transport & communication, finance, business, public administration, teaching, health, and others. This is the same grouping used by [Corden and Neary \(1982\)](#); [Corden \(1984\)](#).

for nontradable goods can only be satisfied with domestic production. This generates an appreciation of the real exchange rate and a reallocation of production and resources from the tradable to the nontradable sector.

When looking at skilled labor intensity across these sectors, it is evident that it is very different. Figure 4, panel (a) shows that the nontradable sector is intensive in skilled labor relative to the tradable sector; in the former the share of skilled workers is 53.2%, whereas in the latter it is 30.7%.¹⁹ If the skilled-labor-intensive sector (nontradable) is expanding relative to the unskilled-labor-intensive one (tradable), then we should expect a rise in the labor income gap instead of the fall I document in the data. How is it possible to reconcile these apparently contradictory patterns?

Figure 3: SECTORAL OUTPUT DYNAMICS AROUND COMMODITY BOOMS



Notes: This figure plots the response of output in the (a) tradable sector, (b) non-tradable sector, (c) service sector, and (d) construction sector to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals. All variables are expressed in log differences.

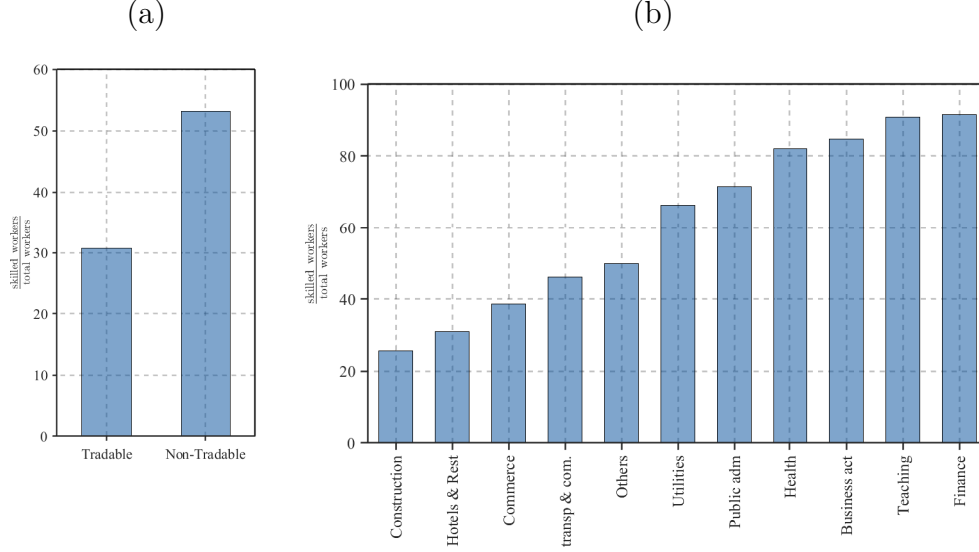
¹⁹This result is interesting in itself since it contradicts part of the common wisdom that considers the nontradable sector as intensive in unskilled labor relative to the tradable sector (see [Goderis and Malone, 2011](#); [Guerra-Salas, 2018](#); [Rodríguez-Castelán et al., 2016](#)). Moreover, this result holds even when I do not consider agriculture as part of the tradable sector and I just compare manufacturing against the nontradable sector (see Appendix Table B.5).

While it is true that the nontradable sector is intensive in skilled labor overall, it hides a lot of heterogeneity inside. Figure 4, panel (b) illustrates this point: While in some sectors more than 90% of workers are skilled (teaching and finance), others, such as construction, are highly intensive in unskilled labor.²⁰ Construction is even more intensive in unskilled labor than the tradable sector, with a share of skilled workers of 26.4%.²¹ How production in these subsectors responds to commodity price shocks may be informative about potential channels driving the dynamics of labor income inequality. For several reasons, a natural comparison consists of disaggregating the nontradable sector into services and construction: (i) the two categories differ in the nature of their use—construction is the primary nontradable input into investment goods, while services are more closely linked to consumption; (ii) construction is the most unskilled-labor-intensive sector within the nontradable sector; and (iii) construction is the only goods-producing sector among nontradables.

²⁰Appendix Table B.6 shows that this pattern also holds within each country in the sample.

²¹Appendix Table B.4 compares the skilled labor intensity for each country between the tradable sector, services, and construction.

Figure 4: SKILLED LABOR INTENSITY BY SECTOR AND WITHIN THE NONTRADABLE SECTOR



Notes: Panel (a) plots the share of skilled workers in total employment for the tradable and non-tradable sectors. Panel (b) plots the share of skilled workers in total employment for each subsector within the nontradable sector. The tradable sector includes agriculture and manufacturing. The nontradable sector includes construction, hotels & restaurants, commerce, transportation & communication, others, utilities, public administration, health, business activities, teaching, and finance. For the tradable and nontradable aggregates, skill intensity is a weighted average of subsector skill intensities, using subsector employment shares as weights, and then averaged across countries and years. For individual subsectors (panel b), skill intensity is the simple average across countries and years.

Figure 3, panels (c)–(d), shows sharp differences within the non-tradable sector. Following a 10% increase in commodity prices, the construction sector experiences a response of around 8% at its peak, two to three years after the shock, while services expand by around 2% over the same period. Appendix Figure B.5 shows that the same pattern arises when looking at employment across sectors.^{22 23} This distinction has been overlooked in the em-

²²In a complementary exercise, I show that labor reallocation increases following commodity booms (see Appendix Figure B.6). Here, I construct a reallocation index based on Chodorow-Reich and Wieland (2020)

²³Given the heterogeneity across nontradable subsectors in terms of skilled-labor intensity, one might wonder whether other unskilled-intensive subsectors also outperform skilled-intensive ones, and whether that could be driving the reduction in labor income inequality independently of construction. Appendix Figure B.7 shows that this is not the case: high-skill and low-skill services follow a very similar trajectory following a commodity price shock, suggesting that the key distinction is between construction and the rest of the nontradable sector, rather than between high- and low-skill services more broadly.

pirical literature on Dutch disease, which has primarily focused on the divergence between tradable and non-tradable sectors.

Together, these results support the following narrative: Commodity booms lead to non-uniform behavior across sectors. As predicted by the Dutch-disease framework, the non-tradable sector expands relative to the non-commodity tradable sector. This dynamic alone might suggest an increase in labor income inequality, given the varying skill intensities across sectors. However, a closer look at the nontradable sectors reveals the existence of a two-speed economy: Construction, the most unskilled-labor-intensive sector, grows four times faster than services, the most skilled-labor-intensive sector in the economy. This differential increase can boost the labor demand and wages of unskilled workers, contributing to a reduction of labor income inequality.

2.4. Robustness

The three facts documented above form the empirical foundation of the paper. Before turning to the model, I perform a series of robustness checks to assess the stability of the baseline results. Appendix B.3 provides additional details on these exercises. First, I show that the results are robust to alternative detrending methods for commodity prices (Figures B.8-B.9). Second, I consider alternative definitions of the shock, including first differences and a specification in which the current value and lags of $p_{i,t}^{Co}$ enter directly in the main empirical specification (Figures B.10-B.11). Third, I augment the baseline with global controls — U.S. monetary policy shocks, a measure of the global financial cycle, a broad dollar index, and a measure of global real GDP growth — to account for the possibility that movements in $p_{i,t}^{Co}$ partly reflect global financial conditions or global demand conditions (Figures B.12-B.15). Fourth, I explore alternative lag structures, additional controls and a specification with country-specific trends (Figures B.16-B.18). Fifth, I assess the role of outliers by re-estimating the baseline while dropping one country at a time (Figure B.19). Finally, I examine whether the baseline result extends beyond the original sample: first, I work with an extended Latin American sample that includes other commodity exporters: Argentina, Brazil, Paraguay, and Uruguay; second, I extend the analysis to a global sample of around

70 commodity-exporting economies, using the Gini coefficient as the inequality measure given data availability (Figures B.20 and B.21). Across all cases, the main patterns remain qualitatively similar to the baseline, with only modest differences in magnitude.

Taking stock

This section presented three key pieces of empirical evidence on the macroeconomic, distributional, and sectoral effects of commodity booms. First, commodity price shocks trigger investment surges and reductions in interest rates. Second, they lead to a decline in labor income inequality between skilled and unskilled workers. Moreover, the sectors that experience the most significant expansion are those that are intensive in unskilled labor. Building on these empirical patterns, the next section develops a quantitative model to analyze the distributional implications of commodity price shocks.

3. Model

In this section, I develop a quantitative model to study the distributional consequences of commodity price shocks. Later, I use the model as a laboratory to think about the distributional implications of alternative ways of using revenue generated by the commodity windfall.

Time is discrete, infinite, and indexed by t . The backbone is an SOE model with tradable goods, nontradable goods, and a commodity sector, which is an endowment fully exported at an exogenous price. The main ingredients of the model are the following. First, given the emphasis on labor income inequality, I add heterogeneous workers who differ in their skill level, which leads them to be employed with varying intensity across sectors in equilibrium. Second, I model two nontradable sectors: services and construction that are used as inputs of different final goods. With this modelling choice, I aim to capture the heterogeneous response of these sectors to the commodity price shock, which is key to explaining the behavior of labor income inequality. Finally, for quantitative reasons, I model an interest rate that is sensitive to commodity price fluctuations which captures common financial frictions in

emerging economies.

The economy is populated by heterogeneous workers, a single capitalist who owns the commodity endowment, final consumption-good, and investment-good producers, three intermediate goods producers operating in the tradable, service, and construction sectors, and a government that collects a share of commodity revenue and allocates it across spending, transfers, and saving. The rest of the model is kept as simple as possible.

Next, I describe each agent's problem, define the competitive equilibrium of this economy, and briefly describe the solution method.

3.1. Production

Production is organized in two tiers. In the upper tier, competitive final-good producers combine intermediate inputs into consumption and investment goods. In the lower tier, competitive intermediate-good producers in the tradable (T), services (S) and construction (C) sector combine capital and labor to produce those inputs.

Final good producers. There is a representative final consumption-good producer and a representative final investment-good producer. I depart from standard SOE models and assume that the two types of final good producers differ in which nontradable sector they draw inputs from. Final consumption-goods producers demand inputs from the service sector, while investment-goods producers demand inputs from the construction sector. This feature of the model is central to the model's mechanism: it allows the service and construction sectors to respond differently to the same aggregate shock, consistent with the empirical patterns documented in Section 2.

Final consumption goods. There is a representative firm that produces a final consumption good c_t by combining intermediate goods from the tradable c_t^T and service sectors c_t^S with constant elasticity of substitution (CES) aggregation technology:

$$c_t = \left[\varphi^{1/\varepsilon_c} (c_t^S)^{1-1/\varepsilon_c} + (1 - \varphi)^{1/\varepsilon_c} (c_t^T)^{1-1/\varepsilon_c} \right]^{\frac{\varepsilon_c}{\varepsilon_c - 1}} \quad (2)$$

where ε_c is the elasticity of substitution and $0 < \varphi < 1$ governs the share of services in aggregate consumption. The profit-maximization problem of the final good producer is as follows:

$$\max_{c_t^S, c_t^T} p_t c_t - p_t^S c_t^S - c_t^T \quad \text{subject to (2)}$$

where p_t, p_t^S are the relative prices of the final consumption good and the inputs from the service sector in terms of the tradable good, which is the numeraire ($P_t^T = 1 \forall t$).

Final investment goods. A representative firm produces a final investment good i_t by combining intermediate goods from the tradable x_t^T and construction sectors x_t^C with CES aggregation technology:

$$i_t = \left[\gamma^{1/\varepsilon_i} (x_t^C)^{1-1/\varepsilon_i} + (1-\gamma)^{1/\varepsilon_i} (x_t^T)^{1-1/\varepsilon_i} \right]^{\frac{\varepsilon_i}{\varepsilon_i-1}} \quad (3)$$

where ε_i is the elasticity of substitution and $0 < \gamma < 1$ governs the share of construction in aggregate investment. Based on national accounts classifications, investment goods can be broadly divided into two categories: equipment and machinery, which are mostly tradable, and structures and infrastructure, which are nontradable and correspond to the construction sector in the model. Then, any shock that generates an investment boom will also generate a construction boom because the required increase in the supply of investment goods to satisfy the greater demand requires more inputs from both the tradable and construction sectors. The profit-maximization problem of the final good producer is as follows:

$$\max_{x_t^C, x_t^T} p_t^I i_t - p_t^C x_t^C - x_t^T \quad \text{subject to (3)}$$

where p_t^I, p_t^C are the relative prices of the final investment good and the inputs from the

construction sector.^{24 25}

Intermediate good producers. Each intermediate good $s \in \{T, S, C\}$ — where T , S , and C denote the tradable, service, and construction sectors, respectively — is produced by a representative firm that combines capital and labor with the following Cobb-Douglas production function:

$$y_t^s = a^s \left[\left(l_t^{H,s} \right)^{\theta_s} \left(l_t^{L,s} \right)^{1-\theta_s} \right]^{\alpha_s} (k_t^s)^{1-\alpha_s}, \quad \alpha_s, \theta_s \in (0, 1) \quad (4)$$

where y_t^s is output in sector s , $\{l_t^{H,s}, l_t^{L,s}\}$ are high- and low-skilled labor inputs, k_t^s are capital inputs, a^s is a productivity factor, and α^s and θ^s are technology parameters. Two important features of the production technology are worth highlighting. First, I depart from standard SOE models and allow for two types of labor inputs used with different intensities in each sector. Second, consistent with the evidence presented in Section 2.3, I assume that the service sector is the most skilled-labor-intensive sector while construction is the most unskilled-labor-intensive one.²⁶ This ordering is central to the model's distributional mechanism, as it governs how a reallocation of labor across sectors following a commodity shock translates into changes in relative wages.

Finally, intermediate goods firms' profit maximization is achieved as follows:

$$\begin{aligned} \max_{l_t^{H,s}, l_t^{L,s}, k_t^s} \quad & \Pi_t^s = p_t^s y_t^s - w_t^H l_t^{H,s} - w_t^L l_t^{L,s} - u_t^s k_t^s, \quad \forall s \in \{T, S, C\} \\ \text{subject to} \quad & (4) \end{aligned}$$

where p_t^s is the price of the intermediate good s ; w_t^H and w_t^L are the wages of high- and

²⁴From the expenditure-minimization problem for aggregate consumption and investment it is possible to recover their respective price indexes: $p_t = [\varphi(p_t^S)^{1-\varepsilon_c} + (1-\varphi)]^{\frac{1}{1-\varepsilon_c}}$, $p_t^I = [\gamma(p_t^C)^{1-\varepsilon_i} + (1-\gamma)]^{\frac{1}{1-\varepsilon_i}}$.

²⁵As I show below, how I have written the model rules out the possibility that households can directly demand construction goods as could happen in a model with housing or durable goods; households demand investment goods, and these are built with construction goods. I leave the discussion about housing and commodity price shocks for future research.

²⁶Formally, this requires that $\alpha_S \theta_S > \alpha_C \theta_C$. Proposition 1 in Appendix C.1 shows that, under perfect labor mobility, the ratio ordering $\frac{l_t^{H,S}}{l_t^{L,S}} > \frac{l_t^{H,T}}{l_t^{L,T}} > \frac{l_t^{H,C}}{l_t^{L,C}}$ — which holds in the data (Section 2.3) — is a sufficient condition for this provided that $\frac{\alpha_s}{\alpha_{s'}} > \frac{\theta_{s'}}{\theta_s}$ for each pair $(s, s') \in \{(S, T), (T, C), (S, C)\}$. This condition is verified from the calibrated parameters.

low-skill workers; and u_t^s is the rental rate of capital in sector s . Since firms are assumed to behave competitively in product and factor markets and operate constant-returns-to-scale production technologies, they always make zero profits.

3.2. Households

There is a mass κ of capitalists and a mass $1 - \kappa$ of workers. Within the mass of workers, a mass μ is low skilled (L) and the remaining $1 - \mu$ is high skilled (H). All workers of a given type are identical and cannot switch across groups. Workers consume and supply labor. Asset ownership is concentrated among capitalists, who do not supply labor.²⁷ This allows the model to isolate the labor market channel driving inequality dynamics; the results do not depend on how financial wealth is distributed across worker types.

Workers. Workers supply labor to the firms and make consumption decisions; they cannot save or borrow, so they behave in hand-to-mouth fashion, entirely consuming their current labor income and any government transfer received. Each worker type is indexed by $j = \{H, L\}$, where H refers to high skilled (or skilled) and L refers to low skilled (or unskilled). Since workers have no savings instrument, their problem is static: each period, worker j chooses (c_t^j, l_t^j) to maximize period utility

$$u^w(c_t^j, l_t^j) \tag{5}$$

subject to the budget constraint

$$p_t c_t^j = w_t^j l_t^j + T_t^j \tag{6}$$

where c_t^j denotes consumption of the final good by worker j in period t ; l_t^j are total hours worked; $T_t^j \geq 0$ are lump-sum transfers from the government to worker type j ; and $u^w(\cdot)$ is a continuous, differentiable, increasing, and concave function. Under the assumption of free labor mobility, workers can move between sectors in response to wage differentials, ensuring

²⁷This structure follows closely from [Cantore and Freund \(2021\)](#).

that a single equilibrium wage exists for each worker type: $\{w_t^H, w_t^L\}$.²⁸ I define $y_t^j = w_t^j l_t^j$ as labor income for worker j ; then, $\eta_t = \frac{y_t^H}{y_t^L}$ is the model counterpart of the labor income gap constructed from data in Section 2.²⁹

Capitalist. A representative capitalist is the sole owner of all assets in the economy: productive capital in each sector and the commodity endowment. In each period, she receives capital rental income, firm profits, and commodity revenues net of taxes. She also consumes a final good, makes investment decisions in each sector s , and saves or borrows in international financial markets. The capitalist maximizes:

$$\mathbb{E}_0 \left\{ \sum_{t=0}^{\infty} \beta^t u^k(c_t^k) \right\}, \quad (7)$$

where $\beta \in (0, 1)$ is the subjective discount factor, $\mathbb{E}_0$ denotes the expectation conditional on information available at time 0, and $u^k(\cdot)$ is a continuous, differentiable, increasing, and concave function. She is subject to the period budget constraint

$$p_t c_t^k + p_t^I \sum_s i_t^s + (1 + r_{t-1}) d_{t-1}^k = d_t^k + \sum_s u_t^s k_t^s + \sum_s \Pi_t^s + (1 - \tau^{Co}) \frac{p_t^{Co} y^{Co}}{\kappa}, \quad (8)$$

and the capital-accumulation equation:

$$k_{t+1}^s = (1 - \delta) k_t^s + i_t^s - \Phi_t^s k_t^s, \quad \forall s = \{T, S, C\} \quad (9)$$

where c_t^k denotes the consumption of the capitalist in period t ; i_t^s is investment in sector s ; p_t^I is the relative price of the investment good; d_t^k is the stock of international debt ($d_t^k > 0$ denotes net borrowing); r_t is the interest rate faced by the SOE; $u_t^s k_t^s$ is capital income from renting capital k_t^s to firms in sector s at rental rate u_t^s ; Π_t^s are profits from intermediate good producers in sector s ; and $\Phi_t^s(\cdot)$ are capital adjustment costs. Finally, the capitalist receives income from owning the commodity endowment y^{Co} , fully exported at an international rel-

²⁸In steady state, I assume $w^H > w^L$.

²⁹Note that labor income inequality η_t and consumption inequality coincide when $T_t^j = 0$.

active price p_t^{Co} . The government imposes a proportional tax $\tau^{Co} \in [0, 1]$ on this revenue, so the capitalist retains only a fraction $1 - \tau^{Co}$ of the windfall; commodity price shocks therefore act as pure wealth shocks whose magnitude is modulated by fiscal policy. Last, the capitalist chooses sequences $\{c_t^k, \{k_{t+1}^s, i_t^s\}_{\forall s}, d_t^k\}_{t=0}^\infty$ to maximize her lifetime utility (7) subject to (8) and (9).

3.3. Government

The government collects revenue by taxing the capitalist's commodity income and allocates it to three uses: spending on the consumption basket G_t , lump-sum transfers to workers $\{T_t^H, T_t^L\}$, and savings in a sovereign wealth fund (SWF) F_t .³⁰ Its period budget constraint is:

$$p_t^G G_t + n^H T_t^H + n^L T_t^L + F_t = rev_t + (1 + r^f) F_{t-1}, \quad (10)$$

where $n^H \equiv (1 - \kappa)(1 - \mu)$ and $n^L \equiv (1 - \kappa)\mu$ are the population shares of high- and low-skill workers, $rev_t = \tau^{Co} p_t^{Co} y^{Co}$ is commodity tax revenue, and r^f is the return on the fund. Government consumption G_t is a CES composite of tradable and service goods, produced with the same technology as the private final consumption-good producers:

$$G_t = \left[(\varphi^G)^{1/\varepsilon^G} (G_t^S)^{1-1/\varepsilon^G} + (1 - \varphi^G)^{1/\varepsilon^G} (G_t^T)^{1-1/\varepsilon^G} \right]^{\varepsilon^G/(\varepsilon^G-1)}, \quad (11)$$

where $\varphi^G \in (0, 1)$ is the service share of government spending and $\varepsilon^G > 0$ is the elasticity of substitution.³¹ Transfers to workers are parameterized as a fraction of commodity tax revenue. The government allocates a share $\zeta^g \in [0, 1]$ of rev_t to total transfers, distributing them between worker types according to:

$$T_t^L = \frac{\zeta^g \pi^L rev_t}{n^L} \quad T_t^H = \frac{\zeta^g (1 - \pi^L) rev_t}{n^H} \quad (12)$$

³⁰ IMF (2015) documents the importance of commodity revenue for fiscal accounts in commodity-dependent economies.

³¹ The associated government spending deflator is $p_t^G = \left[\varphi^G (p_t^S)^{1-\varepsilon^G} + (1 - \varphi^G) \right]^{1/(1-\varepsilon^G)}$, which collapses to the household price index p_t when $\varphi^G = \varphi$ and $\varepsilon^G = \varepsilon^c$.

where $\pi^L \in [0, 1]$ governs the targeting of transfers toward low-skill workers. When $\pi^L = 1$ all transfers go to low-skill workers; when $\pi^L = 0$ all transfers go to high-skill workers.

Given τ^{Co} , ζ^g , and π^L , the government determines two remaining variables: spending G_t and savings F_t . I specify a rule for saving; spending is then determined residually by (10). The government saves a fraction of the windfall component of commodity revenues — defined as deviations from their steady-state level $\overline{rev}$ — in the SWF according to:

$$F_t = (1 - \nu)(1 + r^f)F_{t-1} + \chi (rev_t - \overline{rev}), \quad (13)$$

where $\chi \in [0, 1]$ is the fraction of the windfall saved and $\nu \in (0, 1)$ is a payout rate that recycles a fraction of accumulated fund returns back into government spending each period, ensuring stationarity of the fund.³² Substituting (13) and (12) into (10), government spending is determined residually as:

$$p_t^G G_t = (1 - \zeta^g - \chi) rev_t + \chi \overline{rev} + \nu(1 + r^f)F_{t-1}. \quad (14)$$

Together, the parameters $\{\tau^{Co}, \zeta^g, \chi\}$ provide a flexible representation of the fiscal responses that commodity-exporting economies typically adopt following a windfall.³³ τ^{Co} determines how much of the commodity windfall the government captures; ζ^g determines how much of that revenue is redistributed directly to workers rather than spent on public goods or saved; and χ determines how much is saved in the SWF rather than spent. In the baseline, I set $\chi = 0$ and $\zeta^g = 0$, so the government spends all commodity revenue on the consumption basket each period: $p_t^G G_t = rev_t$. The policy experiments in Section 5 then consider three departures from this baseline: varying τ^{Co} to assess the effect of the tax rate on the distributional consequences of a commodity boom, varying ζ^g and π^L to assess the distributional consequences of worker transfers and their targeting, and varying χ to assess

³²Stationarity requires $(1 - \nu)(1 + r^f) < 1$. In the absence of payouts ($\nu = 0$) the fund grows without bound following positive windfalls, leading to indeterminacy. In practice, ν can be interpreted as a constitutionally mandated spending floor on SWF returns, a feature of several commodity-exporting economies (e.g. Norway's fiscal rule).

³³See Frankel (2010) for a discussion of these policies.

the role of fiscal saving in an SWF.

3.4. Aggregation and Market Clearing

The equilibrium in final goods markets is given as follows:

$$c_t = \kappa c_t^k + (1 - \kappa)[\mu c_t^L + (1 - \mu) c_t^H] \quad (15)$$

$$i_t = \kappa(i_t^T + i_t^S + i_t^C) \quad (16)$$

The market-clearing condition for intermediate nontradable goods (services and construction) requires that:

$$y_t^S = c_t^S + G_t^S \quad (17)$$

$$y_t^C = x_t^C. \quad (18)$$

Labor markets for each worker type $j = \{H, L\}$ clear according to the following equations:

$$n^H l_t^H = l_t^{H,T} + l_t^{H,S} + l_t^{H,C} \quad (19)$$

$$n^L l_t^L = l_t^{L,T} + l_t^{L,S} + l_t^{L,C} \quad (20)$$

By combining the budget constraints of all agents, I obtain the consolidated balance-of-payments equation:

$$(1 + r_{t-1}) d_{t-1} + F_t = d_t + (1 + r^f) F_{t-1} + tb_t, \quad (21)$$

where $d_t = \kappa d_t^k$ is aggregate private external debt, and $tb_t = p_t^{Co} y^{Co} + y_t^T - c_t^T - x_t^T - G_t^T$ is

the trade balance. Last, I define the real exchange rate (rer_t), and real GDP as follows ³⁴:

$$rer_t = \frac{1}{p_t} \quad (22)$$

$$p_t gdp_t = y_t^T + p_t^S y_t^S + p_t^C y_t^C + p_t^{Co} y^{Co} \quad (23)$$

3.5. International Capital Markets and Exogenous Processes

The real interest rate r_t is based on the SOE assumption: the domestic economy takes the world interest rate as given, and the spread it pays over that rate depends on its net external position and commodity prices.

$$r_t = r^* + \psi \left[e^{\tilde{d}_t - \bar{d}} - 1 \right] - \xi \left[\ln(p_t^{Co}) - \ln(\bar{p}^{Co}) \right], \quad (24)$$

The first term, r^* , represents the interest rate paid by the SOE in steady state; it is usually thought of as the sum of the world interest rate and a spread. The second term is standard in the literature and ensures a stationary equilibrium process for external debt (Schmitt-Grohé and Uribe 2003). Parameter ψ controls the sensitivity of the spread to deviations of the economy's *net* external debt $\tilde{d}_t \equiv d_t - F_t$ — the difference between private external liabilities and public foreign assets held in the SWF — from $\bar{d} = \bar{d} - \bar{F}$, its steady-state value.³⁵ The third term aims to capture the empirical relationship between spreads and commodity prices for commodity-exporting economies; parameter ξ governs the strength of the relationship (see Shousha 2016; Drechsel and Tenreyro 2018). The economic intuition is that increases in commodity prices above their steady-state value $\bar{p}^{Co}$ reduce the spreads paid by the economy, amplifying the expansionary effects of the shock. Section 4.4 discusses the role of this mechanism in shaping the model's quantitative predictions, and Appendix B.4 provides empirical support for this assumption.³⁶

³⁴In equilibrium, the definition of GDP can also be expressed in terms of expenditures as: $p_t gdp_t = p_t c_t + p_t^I i_t + p_t^G G_t + t b_t$.

³⁵Because international creditors price the spread against the consolidated external position, higher private borrowing raises the spread while larger SWF assets reduce it. See Bergholt et al. (2019) for a similar treatment in the context of Norway's Government Pension Fund Global.

³⁶Drechsel and Tenreyro (2018) provide a microfoundation for this relationship from first principles, in which domestic firms borrow against collateral linked to commodity revenues. Appendix C.3 presents the

I assume that the real commodity price is the only exogenous driving force in the economy. Consistent with the lag structure in the baseline empirical specification, I assume that the logarithm of p_t^{Co} follows an AR(2) process:

$$\ln(p_t^{Co}) = (1 - \rho_1 - \rho_2) \ln(p^{\overline{Co}}) + \rho_1 \ln(p_{t-1}^{Co}) + \rho_2 \ln(p_{t-2}^{Co}) + \varepsilon_t^{Co} \quad (25)$$

where $\{\rho_1, \rho_2\}$ are autoregressive coefficients and $\varepsilon_t^{Co} \sim \text{i.i.d. } (0, \sigma_{co}^2)$.

3.6. Competitive Equilibrium and Solution Method

A competitive equilibrium consists of sequences of allocations and prices such that all agents optimize, the government satisfies its budget constraint and saving rule, and all markets clear. The formal definition and the full system of nonlinear equilibrium conditions are provided in Appendix C.4. To solve the model, I log-linearize the equilibrium conditions around the non-stochastic steady state and solve the resulting system with standard perturbation methods.

4. Quantitative Analysis

This section analyzes the quantitative predictions of the model following a commodity price shock. Section 4.1 outlines the parameterization of the model. Section 4.2 presents the model's dynamics and discusses the mechanisms at work. Section 4.3 evaluates the model's fit against the data. Section 4.4 inspects the key mechanisms driving the results. Finally, Section 4.5 discusses the model's assumptions and considers potential extensions.

4.1. Parameterization

The model's parameters fall into four groups, reported in Table 2: parameters assigned values from the literature (a), parameters calibrated to match long-run data moments (b), parameters governing the fiscal policy responses to commodity windfalls (c), and parameters that

derivation.

do not affect the model's steady state but govern its short-run dynamics (d). A period in the model corresponds to one year.

Functional forms: I choose a GHH specification for worker j 's period utility, a standard CRRA form for capitalists, and quadratic capital adjustment costs in each intermediate sector:

$$u^{w,j}(c_t^j, l_t^j) = \frac{\left[c_t^j - \nu^j \frac{(l_t^j)^\omega}{\omega} \right]^{1-\sigma}}{1-\sigma}, \quad j = \{H, L\} \quad (26)$$

$$u^k(c_t^k) = \frac{[c_t^k]^{1-\sigma}}{1-\sigma}, \quad (27)$$

$$\Phi_t^s = \frac{\phi^s}{2} \left(\frac{i_t^s}{k_t^s} - \delta \right)^2, \quad s \in \{T, S, C\}. \quad (28)$$

In (26), σ is the coefficient of relative risk aversion, ω is the inverse Frisch elasticity, and ν^j is a worker-type-specific labor disutility scale parameter. The GHH specification is standard in the SOE literature and has the key implication that the income effect does not affect labor supply. Capitalists do not work, so their preferences (27) depend only on consumption. The adjustment cost Φ_t^s in (28) is common across the literature and its parameters $\{\phi^s\}$ are estimated below.

Externally calibrated parameters: Panel (a) of Table 2 reports the values assigned to these parameters together with the corresponding literature sources. I set $\sigma = 2$ and $\omega = 1.35$, standard values in the small open economy literature. The elasticity of substitution in the consumption aggregator is $\varepsilon^c = 0.8$; the investment aggregator uses a Cobb-Douglas specification ($\varepsilon^i = 1$). The depreciation rate is $\delta = 0.07$ and the construction share in the investment aggregator is $\gamma = 0.5$. Labor shares in production are set to $\alpha^T = 0.6$ and $\alpha^S = \alpha^C = 0.7$, reflecting the higher labor intensity of nontradable sectors relative to tradables. The population share of low-skill workers $\mu = 0.50$ corresponds to the sample average across the six

study countries, and the share of capitalists is $\kappa = 0.08$.

Internally calibrated parameters: These parameters are determined jointly by the steady-state equilibrium conditions of the model to match the long-run data moments listed in Panel (b) of Table 2. I take average values across the six study countries for the period 1992–2019.³⁷ The target moments are: an interest rate of 7%, a trade balance to GDP ratio of 1.8%, a commodity output share of GDP of 10%, skilled labor shares by sector $\{s^{H,T}, s^{H,S}, s^{H,C}\} = \{0.31, 0.56, 0.26\}$, and hours worked $h^H = h^L = 0.4$.³⁸ The implied labor income gap in steady state is $\eta = 2.20$, close to its data counterpart of 2.45 for the study countries over the sample period.

Government block: Panel (c) of Table 2 reports the parameters governing the fiscal sector. The commodity tax rate $\tau^{Co} = 0.25$ represents an intermediate value for the countries in my sample.³⁹ In the baseline, the government saves nothing in the SWF ($\chi = 0$) and makes no transfers to workers ($\zeta^g = 0, \pi^L = 0$), so all commodity tax revenue is spent each period on the consumption basket. Under this baseline, r^f and ν are irrelevant for the model’s dynamics and enter only in the policy experiments of Section 5. In those experiments, I raise τ^{Co} and set $\chi > 0$ to study the distributional consequences of, respectively, a more aggressive appropriation of the commodity windfall and savings in an SWF. Finally, the government’s spending aggregator shares the same parameters as the private final consumption-good producer ($\varphi^G = \varphi, \varepsilon^G = \varepsilon^c$).

Estimated parameters: Let $\tilde{\Theta} = \{\phi^T, \phi^S, \phi^C, \psi, \xi\}$ denote the subset of parameters estimated by IRF matching. I follow Christiano et al. (2005) and Uribe and Yue (2006) and choose values to minimize the distance between the empirical impulse response functions from Sec-

³⁷This choice is consistent with the pooled estimator in Section 2, which recovers an average response across countries rather than a country-specific one.

³⁸Sector productivities a^T and a^C adjust to close the production-function residuals given all other steady-state objects; $a^N = 1$ by normalization.

³⁹Some countries in my sample have commodity sectors that are largely privately owned, while others are predominantly state-owned. I discuss the implications of public versus private ownership of the commodity sector in Section 4.5.1.

tion 2.3 and the corresponding model-implied responses. Specifically, letting IR^e denote the vector of empirical IRFs and $IR^m(\tilde{\Theta})$ the corresponding model-implied IRFs, the estimator solves:

$$\hat{\Theta} \equiv \arg \min_{\tilde{\Theta}} \left[IR^e - IR^m(\tilde{\Theta}) \right]' \Sigma_{IR^e}^{-1} \left[IR^e - IR^m(\tilde{\Theta}) \right] \quad (29)$$

where Σ_{IR^e} is a diagonal matrix with the variance of each empirical IRF along the diagonal, penalizing moments estimated with large uncertainty. I match the first eight periods of the IRFs for output, consumption, investment, real exchange rate, trade balance to GDP, and interest rate. The IRF-matching yields three results. First, the data support the presence of financial frictions, captured by $\psi = 0.497$: changes in the net foreign asset position generate a non-negligible effect on the interest rate faced by the economy.⁴⁰ Second, positive commodity price deviations significantly compress interest rate spreads: $\xi = 0.183$ implies that a 10% increase in p_t^{Co} above its steady state reduces spreads by around 1.8 annualized percentage points, where the interest rate equation is expressed in levels.⁴¹ Finally, capital adjustment costs are similar for tradables and services, but notably lower for construction: $\{\phi^T, \phi^S, \phi^C\} = \{0.98, 1.18, 0.45\}$.

The remaining parameters in Panel (d) — $\{\rho_1, \rho_2, \sigma^{Co}\}$ — are obtained by estimating the commodity price equation (25) on the panel for the period 1992–2019. Commodity price shocks are highly persistent: the AR(2) coefficients $\{\rho_1, \rho_2\} = \{1.15, -0.25\}$ imply a hump-shaped autocorrelation function with a half-life of approximately five years.

4.2. Dynamics Following a Commodity Price Shock

This section characterizes the model’s dynamics following a commodity price shock, with the goal of understanding the mechanisms through which commodity booms affect labor income

⁴⁰While there is consensus in the literature regarding the sign of ψ , its magnitude is debated. [Schmitt-Grohé and Uribe \(2003\)](#) argue that a value close to zero suffices to ensure stationarity, while [Garcia-Cicco et al. \(2010\)](#) and [Drechsel and Tenreyro \(2018\)](#) find support for larger values (around 2.8) associated with binding financial frictions. [Schmitt-Grohé and Uribe \(2018\)](#) estimate ψ for 38 countries and find a mean of 17 and a median of 0.58; [Germaschewski et al. \(2024\)](#) finds $\psi = \{0.39, 1.28, 0.43, 2.5\}$ for Chile, Colombia, Mexico, and Peru, respectively.

⁴¹[Drechsel and Tenreyro \(2018\)](#) find $\xi = 0.199$ for Argentina, consistent with this estimate.

Table 2: Calibrated and estimated parameters

Parameter	Description	Value	Source / Target
<i>(a) Externally calibrated parameters</i>			
σ	Risk aversion (CRRA)	2	Standard in SOE literature
ω	Inverse Frisch elasticity	1.35	Standard in SOE literature
ε^c	Elast. of substitution, c^S and c^T	0.8	Akinci (2011)
ε^i	Elast. of substitution, x^C and x^T	1	Medina et al. (2007a)
δ	Depreciation rate	0.07	Medina et al. (2007a)
γ	Const. share in investment aggr.	0.50	Medina et al. (2007a)
$\{\alpha^T, \alpha^S, \alpha^C\}$	Labor shares in production	$\{0.6, 0.7, 0.7\}$	Schmitt-Grohé and Uribe (2018)
μ	Share of low-skill workers in pop.	0.50	Sample average
κ	Share of capitalists in pop.	0.08	Drenik (2016)
$\{p^S, p^C, p^{Co}\}$	Relative prices	$\{1, 1, 1.01\}$	Normalization
<i>(b) Internally calibrated parameters</i>			
β	Discount factor	0.935	Interest rate ($r^* = 7\%$)
φ	Services share in consumption aggr.	0.679	Trade balance/GDP ($S^{tb} = 1.8\%$)
y^{Co}	Commodity endowment	0.064	Commodity output/GDP ($S^{Co} = 10\%$)
$\{\theta^T, \theta^S, \theta^C\}, \frac{w^H}{w^L}$	Skilled-labor int. and skill premium	$\{0.679, 0.729, 0.397\}, 2.20$	Skilled share by sector $\{s^{H,T}, s^{H,S}, s^{H,C}\} = \{0.31, 0.56, 0.26\}$
$\{\nu^H, \nu^L\}$	GHH labor disutility scale	$\{0.725, 0.329\}$	Avg. hours worked ($h^H = h^L = 0.4$)
<i>(c) Government block (baseline)</i>			
τ^{Co}	Commodity tax rate	0.25	Medina et al. (2007b)
$\{\zeta^g, \pi^L\}$	Transfers	$\{0, 0\}$	Baseline: no transfers
χ	SWF saving rate	0	Baseline: no savings
φ^G	Services share in gov. spending aggr.	0.679	Equal to consumption aggr. ($\varphi^G = \varphi$)
ε^G	Elast. of subst., G^S and G^T	0.8	Equal to consumption aggr. ($\varepsilon^G = \varepsilon^c$)
$\{r^f, \nu\}$	SWF return, payout rate	$\{0.036, 0.04\}$	Bergholt et al. (2019)
<i>(d) Estimated parameters</i>			
$\{\rho_1, \rho_2\}$	AR(2) coefficients, p_t^{Co}	$\{1.15, -0.25\}$	Estimated on panel, 1992–2019
σ^{Co}	Std. deviation, ε_t^{Co}	0.094	Estimated on panel, 1992–2019
$\{\phi^T, \phi^S, \phi^C\}$	Capital adjustment costs	$\{0.98, 1.18, 0.45\}$	IRF matching
ψ	Elast. of country risk premium	0.497	IRF matching
ξ	Elast. of r_t to p_t^{Co}	0.183	IRF matching

Notes: Panel (a) lists parameters set from the literature or paper-specific data moments. Panel (b) lists parameters determined endogenously in steady state to match the long-run moments in the Target column. Panel (c) lists parameters governing the government block. Panel (d) lists parameters estimated either directly from the data or by minimizing the distance between empirical and model-implied IRFs.

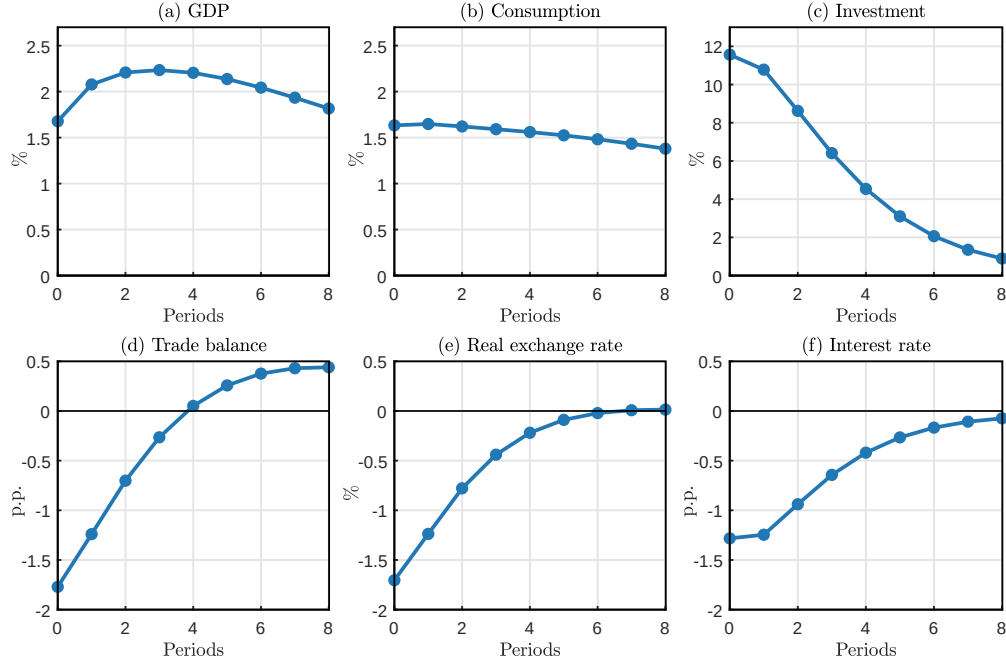
inequality. I simulate the model starting from steady state following a shock that raises p_t^{Co} by 10% on impact. The government operates under the baseline fiscal policy: it spends all commodity tax revenue on consumption goods each period, making no transfers to workers and accumulating no savings in the SWF.

Aggregate and sectoral dynamics. Figure 5 shows that the commodity boom is expansionary: output, consumption, and investment all rise on impact. Two channels drive these effects. First, the shock generates a positive wealth effect: the capitalist’s after-tax commodity income rises, while the government receives additional revenue that it spends on consumption goods, providing a further stimulus to aggregate demand. Second, higher commodity prices reduce the interest rate spreads faced by the economy, amplifying the overall expansionary response.

These expansionary forces appreciate the real exchange rate, contracting the tradable sector and expanding both nontradable sectors — Panel (a) of Figure 6 — consistent with the Dutch-disease mechanism. Within the nontradable sector, the response is heterogeneous: Panel (a) of Figure 6 shows that the construction sector expands several times faster than the services sector on impact, with the gap narrowing as the economy returns to steady state. To understand this two-speed economy within the nontradable sector, note that services and construction serve as inputs to final consumption and investment goods, respectively. Investment is among the most volatile components of GDP and responds far more strongly than consumption (panels (b)–(c) of Figure 5). Several factors drive the investment surge. First, capitalists experience a positive income shock, prompting them to increase their spending on investment goods. Second, the expansion of nontradable sectors raises the marginal product of capital, though this effect is partially offset by the contraction in the tradable sector. Third, the reduction in real interest rates reduces the cost of borrowing providing an additional stimulus to investment. The investment boom therefore drives a disproportionate expansion in construction, which is the key supplier of investment goods.

The trade balance deteriorates on impact. Although commodity exports rise, this is more than offset by higher demand for tradable inputs used in producing final consumption and investment goods.

Figure 5: MACROECONOMIC DYNAMICS FOLLOWING A COMMODITY PRICE SHOCK

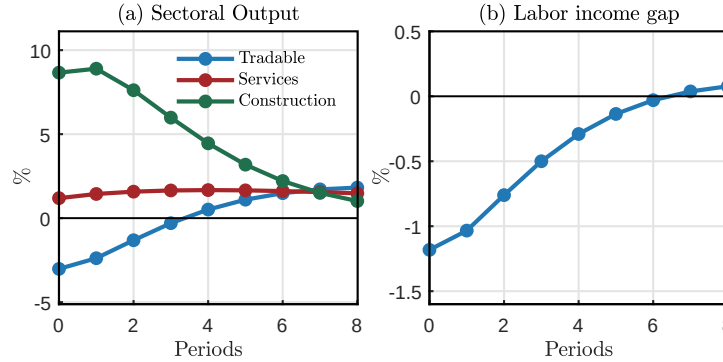


Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, and (f) real interest rate to a commodity price shock that raises p_t^{Co} by 10% on impact. All variables are expressed in log deviations from steady state, except for the trade balance ratio and interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

Labor income inequality. Panel (b) of Figure 6 shows that the model predicts an initial 1.2% decline in the labor income gap η_t , followed by a gradual return to steady state. In the model, the contraction of the tradable sector, combined with the expansion of the nontradable sectors, triggers labor reallocation from the former to the latter. Within the nontradable sector, demand is split between services and construction, but the two sectors compete for different types of workers. The services sector, being more intensive in skilled labor, absorbs disproportionately more high-skill workers; the construction sector, being the most unskilled-labor-intensive sector in the economy, primarily hires low-skill workers. This labor reallocation raises wages for both worker types, but unskilled workers benefit disproportionately given their concentration in the booming construction sector. The key quantitative force is the differential speed of expansion within the nontradable sector: the construction boom is large enough to dominate two countervailing forces — the contraction of the trad-

able sector, which typically employs many unskilled workers, and the expansion of services, which bids up wages for skilled workers — producing a net compression of the income gap.⁴²

Figure 6: SECTORAL OUTPUT AND LABOR INCOME DYNAMICS TO A COMMODITY PRICE SHOCK



Notes: This figure plots the model-implied impulse response functions for (a) Sectoral output (tradable sector, services and construction), and (b) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. All variables are expressed in log deviations from steady state. The time units on the horizontal axis are years.

4.3. Model Validation

The IRF-matching procedure targets six aggregate variables: output, consumption, investment, trade balance to GDP, real exchange rate, and the real interest rate. All remaining variables are untargeted; I focus on labor income inequality and on sectoral output — the variables most directly linked to the paper’s central question.

Appendix Figure C.6 shows the fit for the six targeted aggregate variables. The model reproduces their dynamics fairly well, with most model responses lying within the empirical confidence intervals. The fit is also reasonably good for untargeted variables (Appendix Figure C.7). The model successfully replicates the dynamics of services and construction output. The fit is less clean for the tradable sector. Both the model and the data predict a relative expansion of the nontradable sector vis-à-vis the tradable sector. However, the two differ in how this relative expansion is achieved: in the data, it reflects an expansion of nontradables

⁴²Appendix Figure C.5 decomposes the response of η_t into the contributions of the skill premium and hours worked for each worker type. The fall in labor income inequality reflects a combination of higher wages and more hours worked for low-skill workers relative to high-skill ones.

with a muted response in tradables, while the model generates it through an expansion of nontradables accompanied by a contraction in tradables — the latter being an inherent feature of tradable-nontradable frameworks, in which real exchange rate appreciations compress the tradable sector.

Regarding the paper’s central untargeted moment — labor income inequality — the model succeeds in replicating its main features: it matches the sign and the magnitude of the response in the first periods following the shock, with smoother and less persistent dynamics than the data at longer horizons.

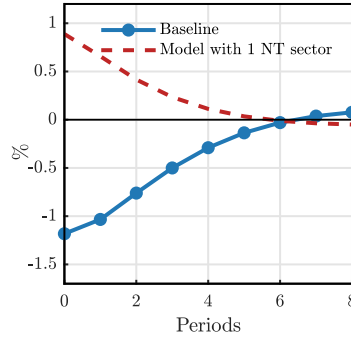
4.4. Inspecting the Mechanism

The model’s ability to generate a decline in labor income inequality following a commodity boom rests on two assumptions. The first is qualitative and determines the direction of the inequality response; the second is quantitative and governs its magnitude.

Heterogeneity within the nontradable sector. Consider an alternative model in which services and construction are collapsed into a single nontradable sector — the tradable-nontradable (TNT) framework used as the canonical model in the Dutch Disease literature. In this framework the same nontradable good serves as input to both final consumption and investment goods. I solve the model under the same calibration as in Section 4.1, with the single nontradable sector’s skill intensity θ^N set to match the overall skilled labor intensity of the nontradable sector.⁴³

⁴³The simplified production structure for this alternative model — which collapses the consumption, investment, and production aggregators into a single nontradable good — is provided in Appendix C.5.

Figure 7: LABOR INCOME GAP - BASELINE MODEL VS STANDARD TNT MODEL



Notes: This figure plots the model-implied impulse response functions for the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid line is IRF from the baseline model; the red dashed line is the IRF from an alternative tradable-non-tradable model (TNT) that makes no distinction between services and construction. The variables are expressed in log deviations from steady state. The time units on the horizontal axis are years.

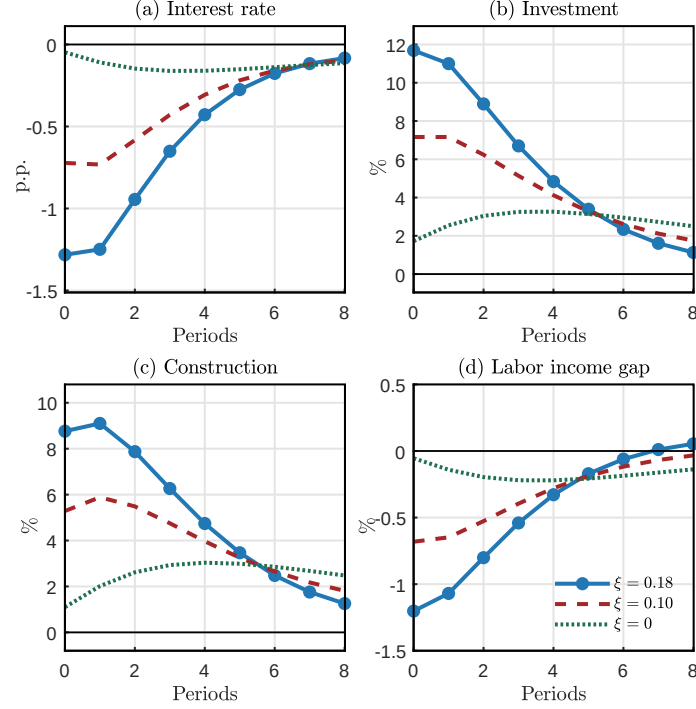
Figure 7 compares the response of η_t in the baseline model and the TNT alternative. In the alternative model, labor income inequality rises following a positive commodity price shock.⁴⁴ The explanation is straightforward: without distinguishing between services and construction, the nontradable sector as a whole is more skill-intensive than the tradable sector (see Figure 4), so the commodity-driven expansion of nontradables raises the relative demand for skilled labor and widens the income gap. A model that ignores this within-sector heterogeneity therefore fails to replicate the empirical decline in labor income inequality documented in Section 2.

Interest rate sensitivity to commodity prices. The parameter ξ in equation (24) governs the sensitivity of the interest rate spread to commodity prices, capturing the empirically documented negative relationship between the two. In the model, this mechanism amplifies the investment response and, through the construction channel, the compression of labor income inequality. Without this assumption, the model still predicts a decline in labor income inequality, but the magnitude is smaller than what is observed in the data. Figure 8 traces

⁴⁴This is consistent with canonical trade models. For instance, [Galiani et al. \(2010\)](#) show in a Heckscher-Ohlin-Samuelson framework that positive terms-of-trade shocks raise income inequality when the nontradable sector is relatively skill-intensive and the tradable sector is unskilled-labor intensive.

the response of the real interest rate, investment, construction output, and the labor income gap η_t for alternative values of ξ .

Figure 8: ALTERNATIVE SENSITIVITY OF INTEREST RATE TO COMMODITY PRICES



Notes: This figure plots the model-implied impulse response functions for (a) real interest rate, (b) investment, (c) construction output, and (d) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the IRFs from the baseline model; the red dashed and green dotted lines are the IRFs from an alternative parameterization of the elasticity of the interest rate to commodity prices (ξ). All variables are expressed in log deviations from steady state, except for the real interest rate, which is expressed in percentage-point deviations. The time units on the horizontal axis are years.

As ξ decreases, the inequality compression weakens. In the extreme case of $\xi = 0$, in which interest rates are entirely insensitive to changes in commodity prices, labor income inequality shows a modest negative response on impact, with a delayed decline in subsequent periods. A lower ξ limits the reduction in interest rates following a commodity price shock, resulting in a smaller investment boom and a more constrained expansion in the construction sector. This moderation disproportionately harms unskilled workers, who are primarily employed in the booming construction sector.

4.5. Discussion of Assumptions and Model Extensions

4.5.1. Discussion of Model Assumptions

Several assumptions in the baseline model are grounded in structural and institutional features of the commodity-exporting economies studied here; I discuss the rationale for each in turn.

Commodity sector as an endowment. The model treats the commodity sector as an endowment, abstracting from supply-side responses to price changes. This is standard practice in the international macroeconomics literature on commodity-exporting economies and is appropriate here because the paper’s focus is on channels operating outside the commodity sector.⁴⁵ If instead the commodity sector featured endogenous production, which given the nature of these sectors should be capital-intensive, a commodity price shock would generate an additional direct demand for capital, amplifying the investment boom and the construction expansion. The model’s endowment assumption may therefore lead it to understate the construction-driven compression of the income gap.⁴⁶

Interest rate sensitivity to commodity prices. Equation (24) captures in a stylized way the negative relationship between interest rate spreads and commodity prices documented for commodity-exporting economies. Section 4.4 shows that this channel is important for the quantitative fit of the model. Appendix B.4 validates this assumption empirically, documenting a strong negative comovement between commodity prices and interest rate spreads for the countries in my sample.

Private ownership of the commodity sector. The model assumes the commodity endowment is owned by the private sector through the capitalist. This is the appropriate

⁴⁵See, for example, [Fernández et al. \(2018\)](#) and [García-Cicco and Kawamura \(2015\)](#) for papers that adopt the same approach.

⁴⁶[Fornero et al. \(2014\)](#) propose a model with endogenous commodity production calibrated to Chile and show that mining investment is an important propagation mechanism for commodity price shocks.

assumption for most countries in the sample: the commodity sectors of Chile, Peru, and Colombia are predominantly privately owned, and Mexico has progressively opened its energy sector to private operators.⁴⁷ The role of the government in taxing and redistributing commodity revenue is then studied explicitly in Section 5.

4.5.2. Model Extensions.

The baseline model makes several simplifying assumptions that keep the framework tractable while delivering the core mechanism linking commodity booms to labor income inequality. This section considers four extensions that relax these assumptions in turn, assessing whether the central result is robust to each modification. Appendix C.6 provides further details.

High-skill workers with saving. The baseline assumes hand-to-mouth behavior for both worker types. Appendix C.6.1 introduces a Ricardian high-skill worker who can save and borrow. Anticipating higher future wages from the commodity boom, high-skilled workers borrow on impact and front-load consumption rather than waiting for wage gains to materialize. This amplified consumption response attenuates the compression of the income gap relative to the baseline through two channels. First, higher consumption raises demand for the services sector — the most skill-intensive nontradable — bidding up skilled wages relative to unskilled. Second, the rise in high-skill borrowing pushes up aggregate debt, tightening the debt-elastic interest rate and crowding out capital accumulation.

Labor reallocation costs. The baseline assumes frictionless labor mobility across sectors. Appendix C.6.2 introduces quadratic reallocation costs, penalizing changes in the sectoral composition of the labor force. As a result, the income gap still falls following a commodity boom, though the adjustment is more gradual. Reallocation costs slow the movement of workers toward the booming construction sector, attenuating and delaying the compression of the income gap without reversing it.

⁴⁷Over 65% of Chile’s copper mines are privately owned. Peru privatized most of its mining sector in the 1990s. In Colombia, state-owned Ecopetrol accounts for only a third of oil production. Ecuador and Bolivia are the exceptions, where Petroecuador and YPFB dominate extraction respectively.

Investment basket. The baseline restricts the investment aggregator to tradable and construction inputs only. Appendix C.6.3 allows the investment aggregator to also draw on service-sector inputs. With this modification, the labor income gap falls by slightly less, since part of the investment demand is redirected toward the skill-intensive services sector, attenuating the upward pressure on unskilled wages. The result is quantitatively small, as construction remains the dominant non-traded investment input.

Government spending aggregator. The baseline sets the government’s spending aggregator equal to the household basket ($\varphi^G = \varphi$). Appendix C.6.4 relaxes that assumption by allowing the government to tilt its spending toward services ($\varphi^G > \varphi$). The results are virtually unchanged relative to the baseline: because government spending accounts for a small share of GDP, even a substantial reallocation of its basket toward services generates a negligible shift in aggregate nontradable demand, leaving the labor income gap response unaffected.⁴⁸

5. Policy Experiments

Having established that the model replicates the main empirical regularities, I use it as a laboratory to evaluate the distributional consequences of alternative policy responses to commodity windfalls. Thus far, I have considered a baseline economy in which the government taxes the capitalist’s commodity income and allocates all revenues to public consumption. I now consider two departures from this baseline, both inspired by policies implemented

⁴⁸A natural extension would allow the government to direct commodity revenue toward public investment rather than consumption goods. Construction-intensive public spending — roads, housing, public buildings — would generate additional demand for construction output, amplifying the expansion of the most unskilled-labor-intensive sector and reinforcing the compression of labor income inequality. Note that this channel would work in the same direction as the baseline result, strengthening the paper’s conclusions. Incorporating it, however, would require treating the government as an investor rather than a consumer, introducing a public capital stock distinct from private capital, and specifying how infrastructure enters the production technology of each sector — a substantially different model structure.

by commodity-exporting economies in response to commodity windfalls.⁴⁹ In the first, the government redistributes commodity revenue away from the capitalist, either through public spending or lump-sum transfers to workers — a policy aimed at sharing the gains from commodity booms broadly. In the second, the government saves the majority of commodity revenue in a sovereign wealth fund (SWF), a strategy aimed at stabilizing the economy and preserving the windfall for future generations.⁵⁰

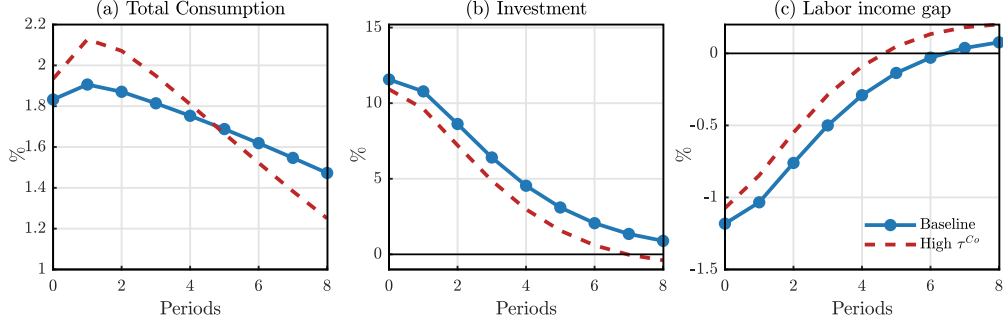
5.1. Policy Experiment I: Redistributing the Windfall

Redistribution from Capitalists. I begin by analyzing the effects of redistributing commodity income away from the capitalist. I increase τ^{Co} from its baseline value of 0.25 to 1, so that the government captures the full commodity income. Figure 9 compares the responses of selected variables in the baseline model and the counterfactual economy following a positive commodity price shock; Appendix Figure C.8 reports the full set of impulse responses. The main finding is that a higher tax rate dampens the inequality-compressing effect of a commodity boom: after the shock, labor income inequality decreases by less in the counterfactual economy.

⁴⁹These policies are part of a broader set discussed by Frankel (2010) for commodity-exporting economies. Other recommended policies include indexation of commodity contracts to world prices, hedging through option markets, and accumulation of international reserves.

⁵⁰Mohaddes and Raissi (2017) documents that there are around 30 commodity dependent economies in the world operating SWFs.

Figure 9: COUNTERFACTUAL I - REDISTRIBUTIVE POLICY - MODEL IRFs



Notes: This figure plots the model-implied impulse response functions for (a) total consumption, (b) investment, and (c) the labor income gap, to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the responses for the baseline case; red dashed lines correspond to an alternative parameterization with $\tau^{Co} = 1$. All variables are expressed in log deviations from steady state. The time units on the horizontal axis are years.

The dynamics driving this effect can be rationalized as follows. Taxing the capitalist reallocates resources from an agent with a high propensity to save and invest to the government, which spends contemporaneously. By reducing the resources available to the capitalist, the aggregate investment response weakens. This leads to a smaller expansion of the construction sector, which is key for producing investment goods and is intensive in unskilled labor. At the same time, the increase in contemporaneous spending raises aggregate consumption, which disproportionately boosts the service sector. Taken together, these forces result in a more muted decline in labor income inequality.

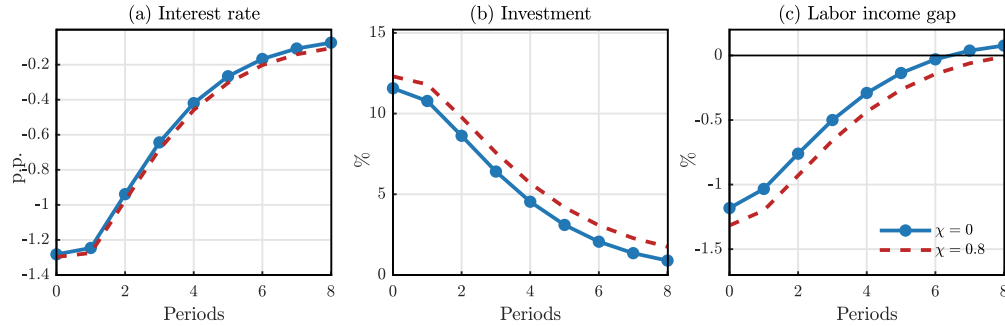
Government Spending vs. Transfers. The experiment above treats all government revenue as spending on consumption goods. A natural question is whether directing that revenue toward lump-sum transfers to workers instead would change the results. It does not. In the baseline, the government does not accumulate savings ($\chi = 0$), and its spending aggregator uses the same weights and elasticity as the private final consumption-good producer ($\varphi^G = \varphi$, $\varepsilon^G = \varepsilon^C$). As a result, both the government and workers spend all resources contemporaneously on the same bundle of goods. Reallocating revenue between them therefore leaves the composition of aggregate demand unchanged, and hence has no effect on equilibrium quantities or relative prices. Proposition 2 in Appendix C.2 formalizes this

result.⁵¹

5.2. Policy Experiment II: Savings in a Sovereign Wealth Fund

In the second experiment, the government saves a fraction of its commodity revenue in an SWF rather than only spending it contemporaneously. I set $\chi = 0.8$, to represent a scenario in which the government saves the bulk of the commodity windfall in an SWF. The remaining parameters are $r^f = 0.036$ and $\nu = 0.04$; see Table 2, panel (c).⁵² Figure 10 compares the impulse responses in the baseline economy with the counterfactual that saves in an SWF. Appendix Figure C.10 reports the full set of impulse responses.

Figure 10: COUNTERFACTUAL II — SOVEREIGN WEALTH FUND — MODEL IRFs



Notes: This figure plots the model-implied impulse response functions for (a) real interest rate, (b) investment, and (c) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the responses for the baseline case in which the government makes no savings in the SWF ($\chi = 0$); red dashed lines correspond to the case in which the government saves a fraction of its revenue in the SWF ($\chi = 0.8$). All variables are expressed in log deviations from steady state, except for the real interest rate, which is expressed in percentage-point deviations. The time units on the horizontal axis are years.

The main finding is that saving in an SWF *amplifies* the inequality-compressing effect of the boom. The mechanism runs as follows. A government that saves most of its commodity

⁵¹The equivalence extends to the distribution of transfers across worker types, governed by π^L , which controls the share of transfer income allocated to low-skill workers. As long as both worker types are hand-to-mouth, the intra-worker distribution of transfers does not affect any market-clearing condition. This breaks down once skilled workers can borrow and save. In Appendix Figure C.9, I extend the model to allow skilled workers to save and vary the distribution of transfers across worker types (π^L).

⁵²The parameter values χ , r^f , and ν follow Bergholt et al. (2019), who provide a calibrated small open economy model of Norway, a well-known example of an economy managing its commodity windfall through a sovereign wealth fund.

revenue in an SWF improves the consolidated net foreign asset position of the economy, captured by the term $\tilde{d}_t = d_t - F_t$ in the interest rate equation. A stronger external position reduces the country risk premium faced by the economy. The scope for this effect depends on the degree of financial frictions (parameter ψ); as documented in Section 4.1, these frictions are quite large in the estimated model. Panel (a) of Figure 10 shows that in the counterfactual economy, the interest rate falls by more on impact and remains lower throughout the adjustment path.⁵³ The lower borrowing cost stimulates private investment (panel (b)), amplifying the expansion of the construction sector and its disproportionate absorption of unskilled workers. As a result, the fall in labor income inequality is larger on impact than in the baseline.⁵⁴ This effect is compounded when τ^{Co} is higher: a larger tax rate raises the revenue base from which the government saves, strengthening the improvement in the external position and generating a larger reduction in the interest rate (see Appendix Figure C.12).

Takeaways. Within the framework of the model, the policy response to a commodity windfall shapes its distributional consequences. Policies that redirect resources away from the capitalist — the agent responsible for capital accumulation — dampen the investment boom and attenuate the inequality-compressing effect of the shock. Conversely, saving the windfall in an SWF reduces the country risk premium, amplifies investment, and reinforces the compression of labor income inequality — a channel that operates precisely because of the financial frictions present in these economies.

⁵³Appendix Figure C.11 decomposes movements in the interest rate into the component driven by commodity prices and the component driven by changes in the net foreign asset position (NFA). The improvement in the NFA position accounts for the lower interest rate in the counterfactual relative to the baseline. In an economy without financial frictions ($\psi = 0$), accumulating assets in the SWF would improve the external position without affecting the interest rate.

⁵⁴Saving in the SWF also reduces contemporaneous government spending, which lowers aggregate demand for services and further supports the reallocation of labor toward construction. This fiscal channel reinforces the interest rate channel, though quantitatively it plays a secondary role.

6. Conclusion

This paper examines the distributional consequences of commodity price shocks in commodity-exporting economies, focusing on labor income inequality between skilled and unskilled workers. Using a panel of Latin American commodity exporters, I establish that positive commodity price shocks compress the skill premium—not through direct effects within the commodity sector, but through an indirect channel operating in nontradable sectors. Construction, being disproportionately intensive in unskilled labor, expands substantially relative to services following a commodity windfall; this asymmetric expansion bids up unskilled wages relative to skilled wages, reducing labor income inequality.

To interpret these patterns, I develop a quantitative multisector small-open-economy model with heterogeneous workers that successfully accounts for the dynamics of the labor income gap. I then use the model to evaluate alternative policy responses. Redistributing commodity revenue away from the capitalist—whether through public consumption or worker transfers—moderates the reduction in inequality by weakening the investment and construction boom. Saving the windfall in a sovereign wealth fund amplifies the reduction by improving the economy’s external position, lowering the country risk premium, and stimulating aggregate investment. Together, these experiments show that the distributional impact of a commodity boom depends critically on who captures the windfall and how it is allocated.

This paper opens several avenues for future work. First, this paper focuses on the short-run distributional benefits of commodity booms. But these booms may also carry long-run costs through their effects on human capital formation. Following the mechanism developed here, the regions most exposed to commodity shocks experience the largest expansions in unskilled-labor-intensive sectors, raising the opportunity cost of remaining in school. In ongoing work, I find suggestive evidence that commodity booms lead to higher school dropout rates in more exposed regions. In the short run, this reinforces the compression of labor income inequality; in the long run, however, lower educational attainment can generate a less-skilled workforce, weaker productivity growth, and ultimately higher and more persistent inequality once the boom subsides. I am currently studying this trade-off between short-run

inequality reduction and long-run human capital costs.

Second, a natural extension would enrich the model with consumption heterogeneity, allowing workers to differ not only in what they earn but in what they consume—specifically, in their exposure to commodity-related goods within their consumption basket. When interacted with heterogeneous liquidity constraints across households, this margin could amplify or dampen the aggregate effects of commodity price shocks identified here. Understanding these interactions, and how policymakers should respond to moderate the resulting business cycle dynamics, is part of my current research agenda.

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Appendix to
“The Distributional Consequences of
Commodity Booms”

April 19, 2026

Emilio Colombi

A. Data

The dataset includes yearly data for Bolivia, Chile, Colombia, Ecuador, Mexico and Peru. This data is included in the empirical analysis of Section 2.

A.1. Macroeconomic Data

- **Commodity prices:** I work with 13 commodities: energy (coal, crude oil, natural gas) and metals (aluminum, copper, gold, iron ore, lead, nickel, tin, uranium and zinc). For commodity prices, I use data from the IMF Primary Commodity Price Database. To construct the weights of each commodity, I use data from UN-COMTRADE.
- **GDP, Consumption, Investment, Exports, Imports and Government spending:** all the data is expressed in constant prices in local currency units. Data is from the IMF-IFS.
- **Real Exchange Rate:** It is constructed using the nominal exchange rate (measured in units of local currency per U.S. dollar), the US domestic consumer price index, and the US consumer price index. Data is from the IMF-IFS.
- **EMBI:** This measure proxies the country specific interest rates in international financial markets. It is measured as the sum of the J.P. Morgan's EMBI+ sovereign spread and the U.S. real interest. EMBI+ is a composite index of different U.S. dollar-denominated bonds on four markets: Brady bonds, Eurobonds, U.S. dollar local markets and loans. Data is from Bloomberg.

A.2. Sectoral Data

- **Sectoral output:** all data is value added in current or constant prices in local currency units. Data is from national accounts.

A.3. SEDLAC

- Data is from the SEDLAC database.⁵⁵ Surveys are collected by the respective national statistics offices (NSOs) and harmonized through the SEDLAC Project. Labor income is after tax and before transfers. It considers main occupation of full-time workers (35+ hours per week). When using real labor income, I deflate series by country-specific consumer price indexes. Individuals' skills are determined based on their complete years of schooling.

⁵⁵See the SEDLAC Project webpage: <https://www.cedlas.econo.unlp.edu.ar/wp/en/estadisticas/sedlac/>

B. Appendix of Empirical Analysis

B.1. Additional Figures and Tables

Table B.1: MAIN COMMODITY PRODUCTS

Country	Commodities
Bolivia	Natural Gas (21%), Zinc (15 %), Gold (10%)
Chile	Copper (69%), Fish (12%), Soft sawn (5%)
Colombia	Crude Oil (53%), Coal (15%), Coffee (15%)
Ecuador	Crude Oil (55%), Bananas (25%), Chrimp (9%)
Mexico	Crude Oil (82%), Copper (3%), Coffee (2%)
Peru	Gold (28%), Copper (22%), Zinc (12%)

Notes: This table presents the three largest commodities exported by each country in my sample as share of total commodity exports.

Table B.2: COMOVEMENT ACROSS INEQUALITY MEASURES

Country	$corr(gini, \eta^{gap})$	$corr(\frac{p_{90}^{th}}{p_{10}^{th}}, \eta^{gap})$	$corr(\frac{p_{95}^{th}}{p_{5}^{th}}, \eta^{gap})$
Bolivia	0.87	0.90	0.94
Chile	0.45	0.69	0.75
Colombia	0.65	0.80	0.80
Ecuador	0.97	0.83	0.81
Mexico	0.71	0.42	0.04
Peru	0.87	0.79	0.78
Average	0.75	0.74	0.69

Notes: This table presents the correlations between my baseline measure of labor income inequality (η^{gap}) and alternative measures: Gini coefficient, ratio of percentile 90th to percentile 10th ($\frac{p_{90}^{th}}{p_{10}^{th}}$) and ratio of percentile 95th to percentile 5th ($\frac{p_{95}^{th}}{p_{5}^{th}}$). The values for each country are the average for the period 1992-2019.

Table B.3: SHARE OF SKILLED WORKERS ACROSS COUNTRIES

	(a) High school or more	(b) Some college or more
Bolivia	39.5	15.1
Chile	55.3	18.7
Colombia	51.8	17.3
Ecuador	42.2	15.6
Mexico	30.5	12.3
Peru	55.5	20.9
Average	45.6	16.6
US	90.1	59.8

Notes: This table presents the share of skilled workers to total workers for two definitions of skilled workers. The values for each country are the average for the period 1992-2019.

Table B.4: SHARE OF SKILLED WORKERS ACROSS SECTORS

	Tradables	Non-tradables		
		All	Services	Construction
Bolivia	25.7	49.8	53.7	25.6
Chile	40.9	61.4	66.5	29.7
Colombia	32.7	55.2	57.7	28.3
Ecuador	29.1	50.6	54.3	21.9
Mexico	15.6	37.7	41.1	14.1
Peru	40.2	64.1	66.4	38.9
Average	30.7	53.2	56.6	26.4

Notes: This table presents the share of skilled workers for each country in my sample. Tradable sector include agriculture and manufacturing. Non-tradable sector is split into construction and services (all the remaining sub-sectors). The values for each country are the average for the period 1992-2019.

Table B.5: SHARE OF SKILLED WORKERS ACROSS SECTORS

	Manufacturing	Non-tradables		
		All	Services	Construction
Bolivia	40.3	49.8	53.7	25.6
Chile	54.2	61.4	66.5	29.7
Colombia	51.0	55.2	57.7	28.3
Ecuador	43.8	50.6	54.3	21.9
Mexico	24.9	37.7	41.1	14.1
Peru	59.0	64.1	66.4	38.9
Average	45.5	53.2	56.6	26.4

Notes: This table presents the share of skilled workers for each country in my sample. Non-tradable sector is split into construction and services. The values for each country are the average for the period 1992-2019.

Table B.6: SHARE OF SKILLED WORKERS ACROSS NON-TRADABLE SECTORS

	Bolivia	Chile	Colombia	Ecuador	Mexico	Peru
Finance	91.5	91.0	91.9	82.8	82.3	97.8
Teaching	90.7	83.8	91.3	86.9	84.7	96.4
Business act	84.7	77.8	66.3	67.2	58.9	84.6
Health	82.1	76.6	79.1	81.1	73.7	90.2
Public adm	71.6	78.1	89.1	73.4	55.2	83.5
Utilities	66.3	70.7	76.2	64.3	45.6	78.8
Others	49.8	62.9	48.8	45.3	40.1	60.6
Transp & Communic	46.1	56.9	47.9	43.6	24.5	67.2
Commerce	38.7	55.9	48.3	44.3	27.9	56.2
Hotels & Rest	31.0	53.3	36.7	35.4	19.4	45.8
Construction	25.6	29.7	28.3	21.9	14.1	38.9

Notes: This table presents the share of skilled workers for each subsector within the non-tradable sector, and for each country in my sample. The values for each country are the average for the period 1992-2019.

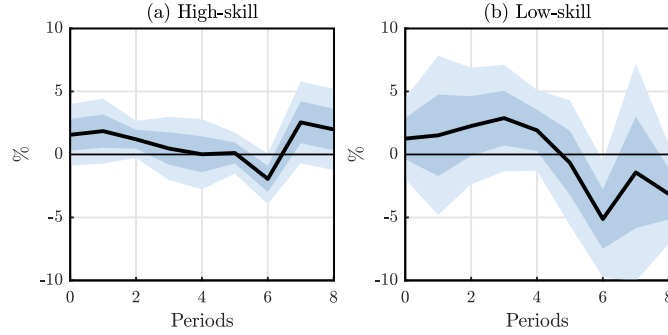
B.2. Additional graphs

Figure B.1: Wage dynamics around commodity booms



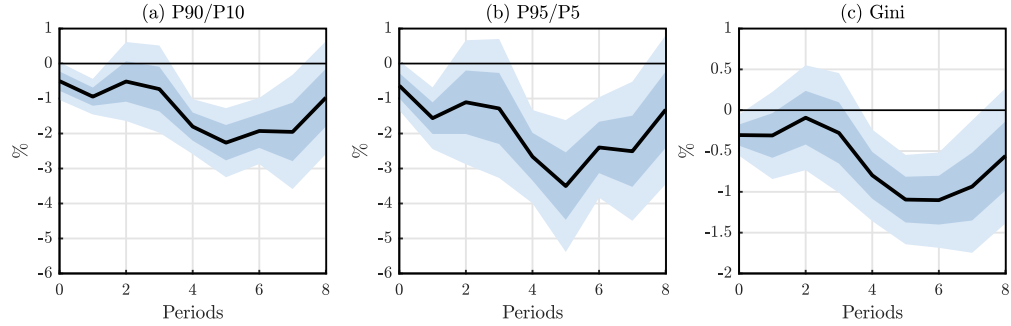
Notes: This figure plots the response of (a) High-skill wages, (b) Low-skill wages, and the (c) Skill premium or wage gap ($\frac{w^H}{w^L}$) to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.2: Hours worked around commodity booms



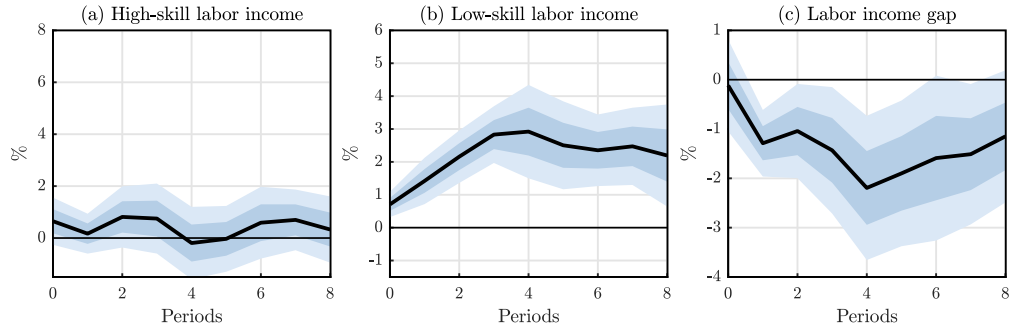
Notes: This figure plots the response of (a) High-skill hours worked, and (b) Low-skill hours worked, to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.3: Labor income dynamics around commodity booms - alternative measures



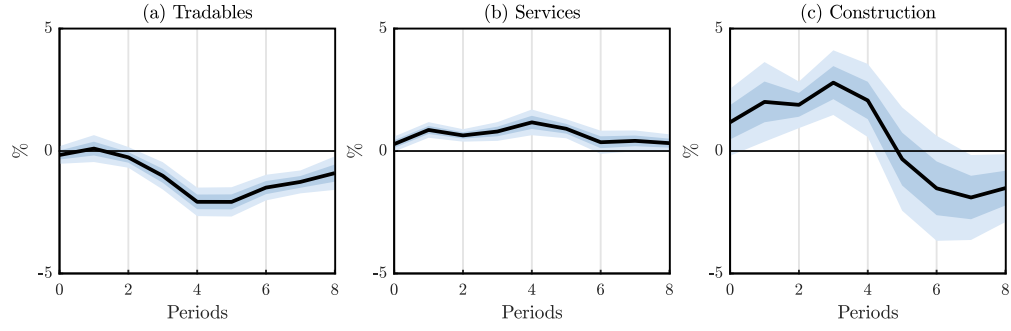
Notes: This figure plots the response of the (a) ratio of percentile 90th to percentile 10th of the labor income distribution, (b) ratio of percentile 95th to percentile 5th of the labor income distribution, and (c) Gini coefficient to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals in the baseline case. Ratio of percentiles are measured in log differences while the Gini coefficient is measured in absolute difference.

Figure B.4: Labor income dynamics around commodity booms - alternative definition of skilled/unskilled workers



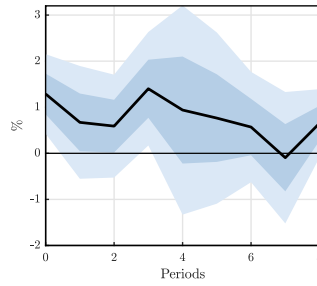
Notes: This figure plots the response of (a) high-skill real labor income, (b) low-skill real labor income, and (c) the labor income gap ($\frac{y^H}{y^L}$) to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.5: Sectoral employment dynamics around commodity booms



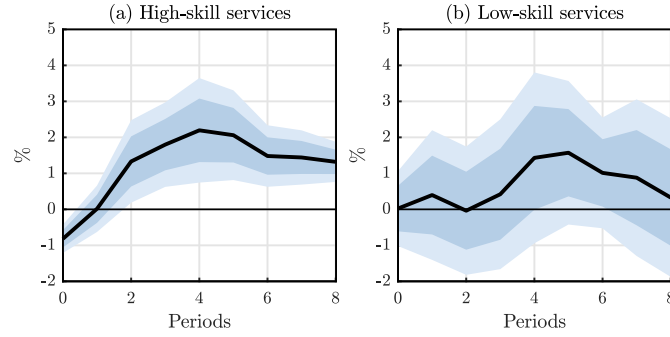
Notes: This figure plots the responses of employment in the (a) Non-commodity tradable, (b) Services, and (c) Construction sectors to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.6: Labor reallocation around commodity booms



Notes: This figure plots the response of the labor reallocation index to a 10% increase in commodity prices. Following Chodorow-Reich and Wieland (2020), the labor reallocation index is defined as $R = \frac{1}{2} \sum_m s_{m,t} \left| \frac{1+g_{m,t}}{1+g_t} - 1 \right|$, where m indexes sectors, $g_{m,t}$ and g_t denote sectoral and aggregate employment growth rates, and $s_{m,t} = e_{m,t}/e_t$ is the employment share of sector m . The coefficient β^h is obtained by running Equation (1) in the text for different horizons h . Error bands represent 68% and 90% confidence intervals.

Figure B.7: High vs Low skill services dynamics around commodity booms



Notes: This figure plots the response of output in the services sector, disaggregated into (a) high-skill services and (b) low-skill services, to a 10% increase in commodity prices. High-skill services include finance, teaching, business activities, health, public administration and utilities. Low-skill services include hotels & restaurants, transportation & communication, commerce, and other services. Each plot shows the coefficient β^h obtained by running Equation (1) for different horizons h . Error bands represent 68% and 90% confidence intervals.

B.3. Empirics robustness

Detrending methods for commodity prices. In the baseline, I obtain the cyclical component of $p_{i,t}^{Co}$ by removing a country-specific quadratic time trend. Here I consider two alternatives: a linear trend and the Hodrick-Prescott filter. The main results are unchanged under both alternatives. Appendix Figures B.8 and B.9 display the results.

Commodity price shock definition. In the baseline, the commodity price shock is measured as the detrended commodity price index $p_{i,t}^{Co}$, obtained by removing a country-specific quadratic time trend from the raw index $P_{i,t}^{Co}$. I consider two alternatives.

AR process residuals: Following Gazzani et al. (2024), I include the current value and lags of the raw commodity price index ($P_{i,t}^{Co}$) directly in the main empirical specification. This is algebraically equivalent to a two-step procedure in which the shock is identified as the residual from a country-specific AR process estimated in a first stage, and then plugged into the local projection. The one-step approach has the advantages of providing more precise estimates and allowing for differential persistence across observations. Appendix Figure B.10 displays the results.

First differences: I also use the log difference of the raw commodity price index, $\Delta P_{i,t}^{Co} = \log P_{i,t}^{Co} - \log P_{i,t-1}^{Co}$, as an alternative shock measure. The advantage of this alternative is that it achieves stationarity without imposing a parametric trend. Appendix Figure B.11 displays the results.

Additional Global Controls. To account for the possibility that movements in $p_{i,t}^{Co}$ partly reflect changes in global financial conditions or global real demand, I augment the baseline specification with four sets of external controls, added in turn: (i) the series of U.S. monetary policy shocks from Jarociński and Karadi (2020); (ii) a measure of the global financial cycle from Miranda-Agrippino and Rey (2020); (iii) the nominal broad dollar index from Obstfeld and Zhou (2022); and (iv) a measure of global real GDP growth from Obstfeld and Zhou (2022), constructed as the first principal component of real GDP growth across a large cross-section of countries. The results remain stable across all four augmented specifications. Appendix Figures B.12–B.15 display the results.

Lag structure, additional controls and country-specific trends. The baseline sets $J_p = J_y = 2$ lags and includes a common quadratic time trend. I consider three modifications. First, I reduce the lag order to $J_p = J_y = 1$. Second, I augment each regression with lags of a broader set of macroeconomic controls — output, consumption, investment, the real exchange rate, the trade balance-to-GDP ratio, and the EMBI — rather than only lags of the dependent variable. Third, I replace the common trend with a country-specific linear trend, allowing each country’s long-run path to differ. The main results are robust to all three changes. Appendix Figures B.16–B.18 display the results.

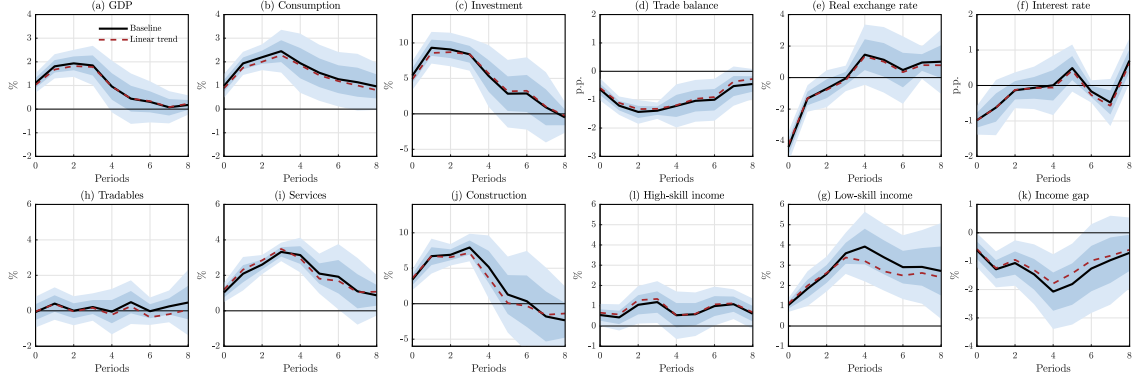
Outliers. To rule out that the baseline results are driven by a single country, I re-estimate the specification six times, each time dropping one of the sample countries — Bolivia, Chile, Colombia, Ecuador, Mexico, and Peru — and retaining the remaining five. The impulse responses are stable across all leave-one-out samples, confirming that no single country disproportionately determines the findings. Appendix Figure B.19 displays the results.

Sample extensions. I examine whether the baseline result extends to broader samples. First, I add four Latin American economies — Argentina, Brazil, Paraguay, and Uruguay — to the baseline sample. Panel (a) of Figure B.20 shows that labor income inequality also falls in this extended sample. Second, I extend the analysis to a global sample of 72 commodity-exporting economies covering the period 1992–2019, using the Gini coefficient as the inequality measure given data availability.⁵⁶ Panel (a) of Figure B.21 shows that the result holds, with the Gini falling by around 0.3 percentage points at its peak following a 10% increase in commodity prices.

To assess whether the construction channel identified in the baseline also operates in broader samples, I estimate the sectoral GDP responses in both extended samples. Panels (b)–(d) of Figures B.20 and B.21 report the results. In both cases, construction output expands significantly following a commodity boom, outpacing the response of services output and with tradable output remaining muted — consistent with the mechanism documented in the baseline analysis.

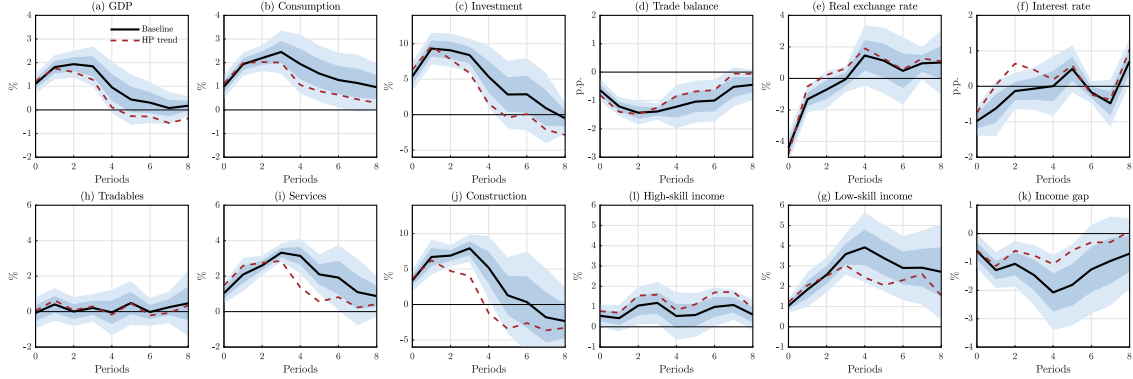
⁵⁶I build the sample of commodity-exporting economies following the classification in [United Nations Conference on Trade and Development \(2021\)](#). The countries included are: Algeria, Angola, Argentina, Armenia, Australia, Azerbaijan, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Chile, Colombia, Cote d’Ivoire, Djibouti, Ecuador, Ethiopia, Fiji, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Guyana, Iceland, Iran, Jamaica, Kazakhstan, Kenya, Kuwait, Lao PDR, Malawi, Maldives, Mali, Mauritania, Mongolia, Montenegro, Mozambique, Namibia, New Zealand, Niger, Nigeria, Norway, Oman, Papua New Guinea, Paraguay, Peru, Qatar, Russian Federation, Rwanda, Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Suriname, Syria, Tajikistan, Tanzania, Timor-Leste, Tonga, Turkmenistan, Uganda, United Arab Emirates, Uruguay, Uzbekistan, Venezuela, Yemen, Zambia, Zimbabwe. Given the lack of harmonized microdata to recover labor income by skill groups for so many countries, I use the Gini coefficient since it is the indicator that allows for the widest comparison across countries and time.

Figure B.8: DYNAMICS AROUND COMMODITY BOOMS - LINEAR DETRENDING



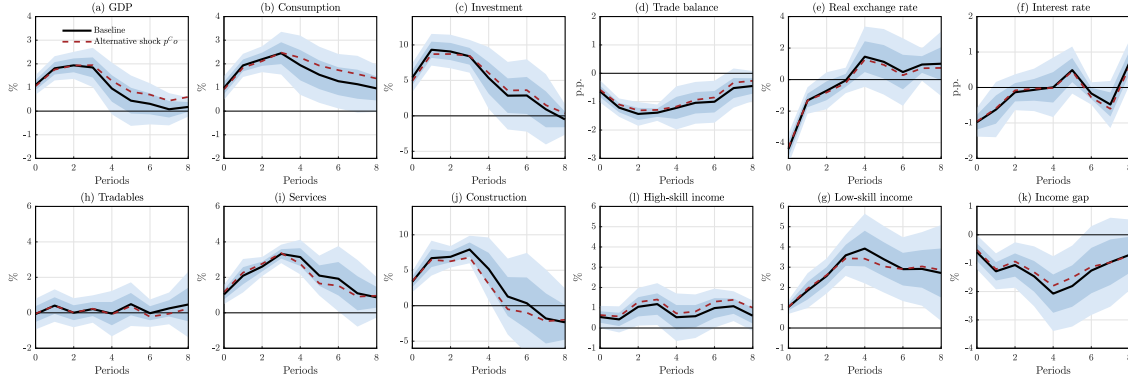
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when the country-specific commodity price indexes are linearly detrended. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.9: DYNAMICS AROUND COMMODITY BOOMS - HP DETRENDING



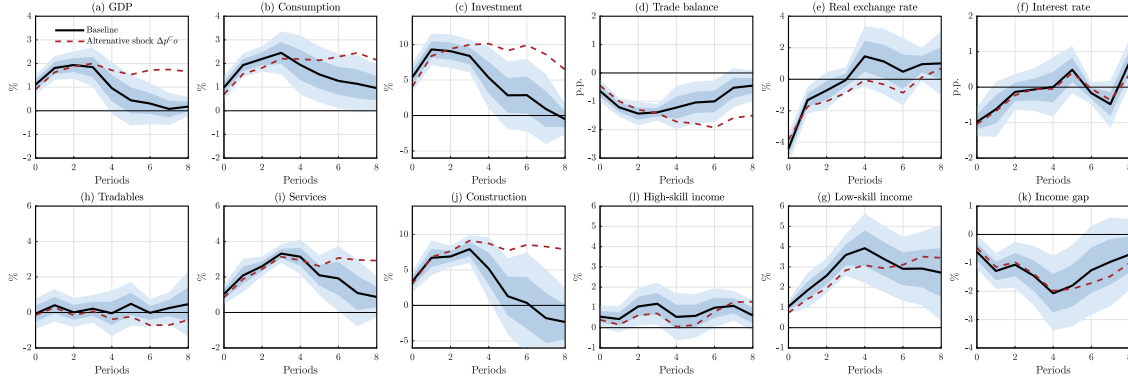
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when the country-specific commodity price indexes are detrended with an HP filter. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.10: DYNAMICS AROUND COMMODITY BOOMS - p^{Co} AS AN AR(2)



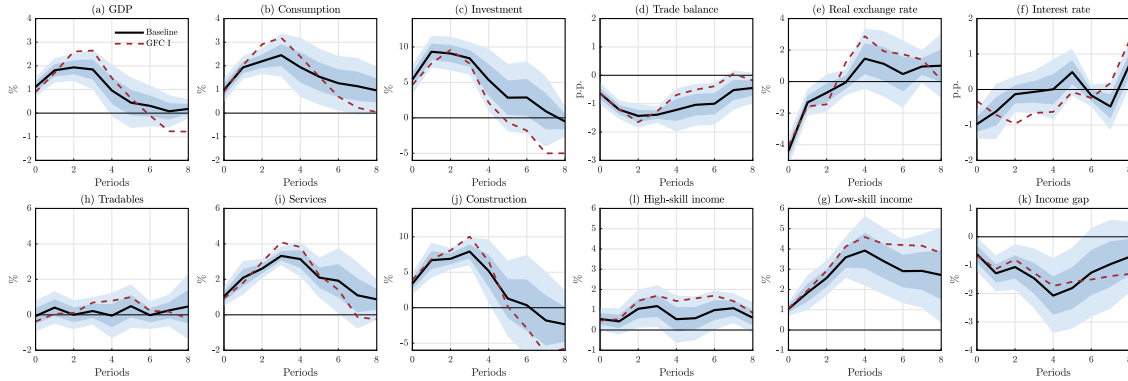
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses for the case in which the commodity price shock is identified with an AR(2). Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.11: DYNAMICS AROUND COMMODITY BOOMS - $P_{i,t}^{Co}$ IN DIFFERENCES



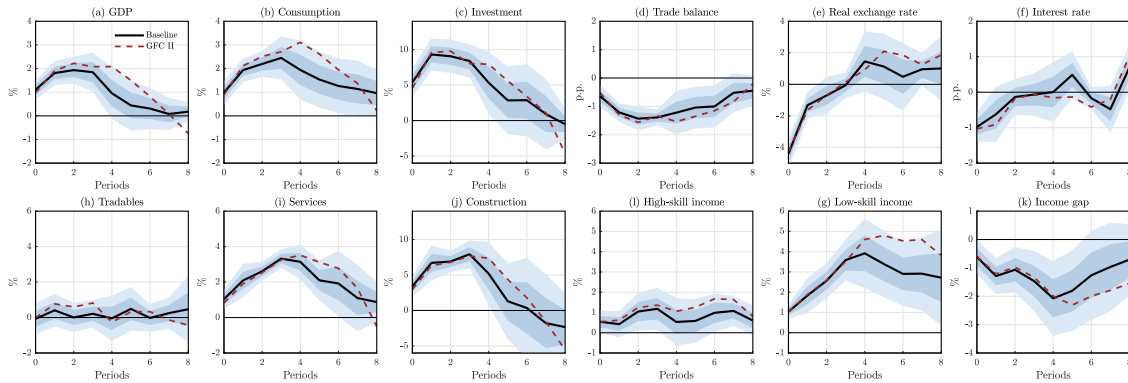
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses for the case in which the commodity prices are included in difference $\Delta P_{i,t}^{Co}$. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.12: DYNAMICS AROUND COMMODITY BOOMS - GLOBAL FINANCIAL CYCLE I



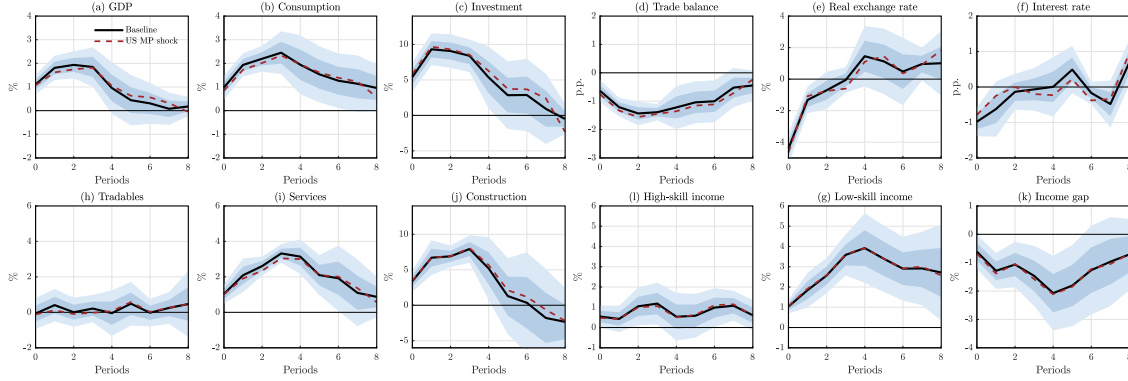
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when including a measure of the global financial cycle from [Miranda-Agrippino and Rey \(2020\)](#). Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.13: DYNAMICS AROUND COMMODITY BOOMS - GLOBAL FINANCIAL CYCLE II



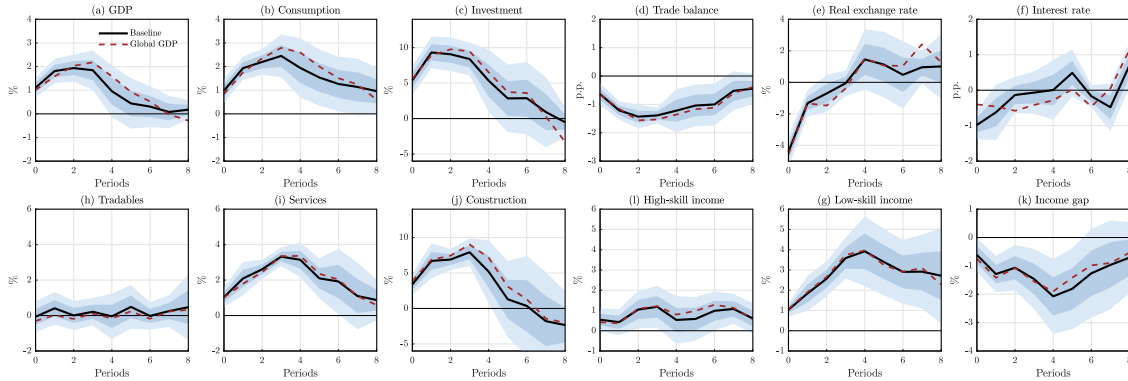
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when including a series of controls to account for the global factors (nominal broad dollar index, an index of financial conditions and changes in the fed fund rate) as in [Obstfeld and Zhou \(2022\)](#). Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.14: DYNAMICS AROUND COMMODITY BOOMS - US MONETARY POLICY SHOCKS



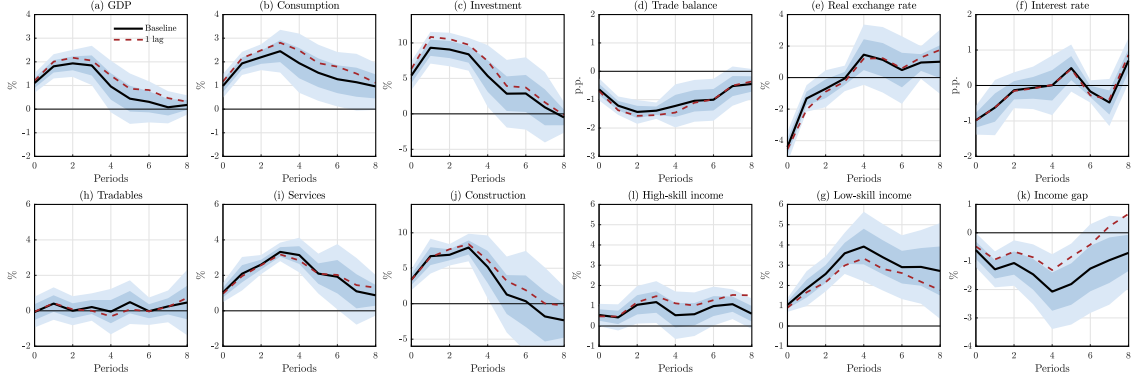
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when including the series of U.S. monetary policy shocks from [Jarociński and Karadi \(2020\)](#). Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.15: DYNAMICS AROUND COMMODITY BOOMS - GLOBAL REAL GDP FACTOR



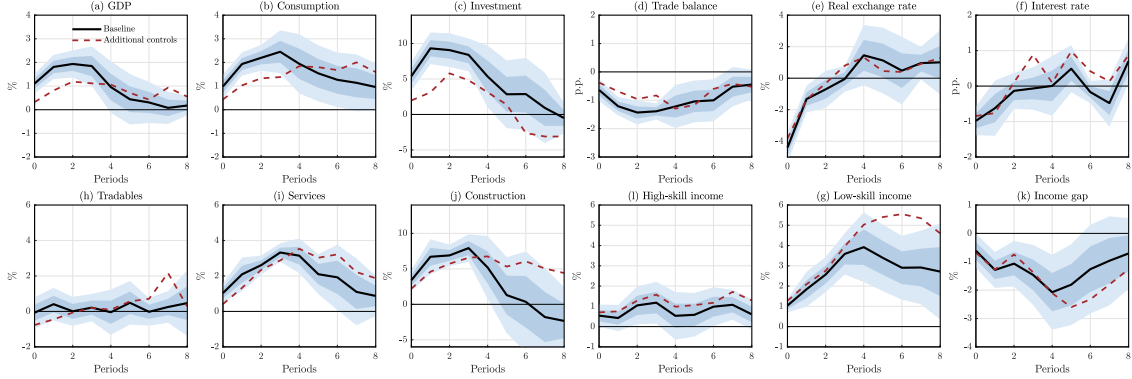
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when including a measure of global real GDP growth from [Obstfeld and Zhou \(2022\)](#), constructed as the first principal component of real GDP growth across a large cross-section of countries. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.16: DYNAMICS AROUND COMMODITY BOOMS - 1 LAG



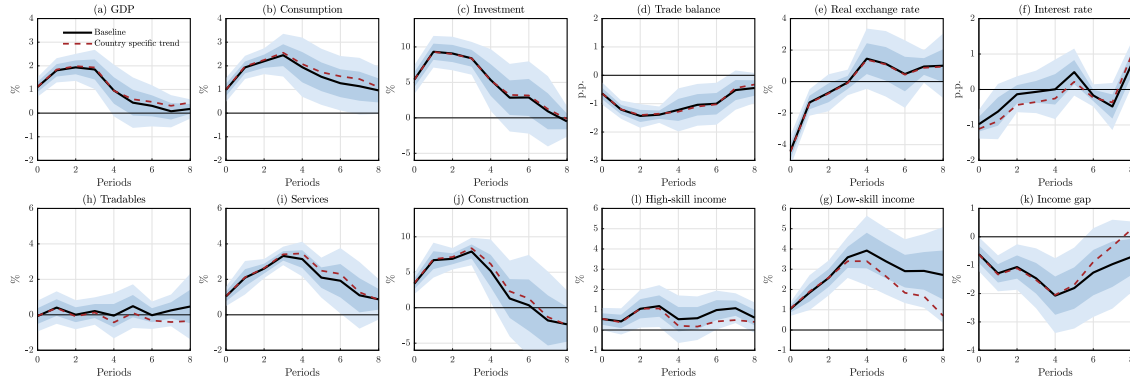
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when including only 1 lag of the dependent variable. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.17: DYNAMICS AROUND COMMODITY BOOMS - ADDITIONAL MACRO CONTROLS



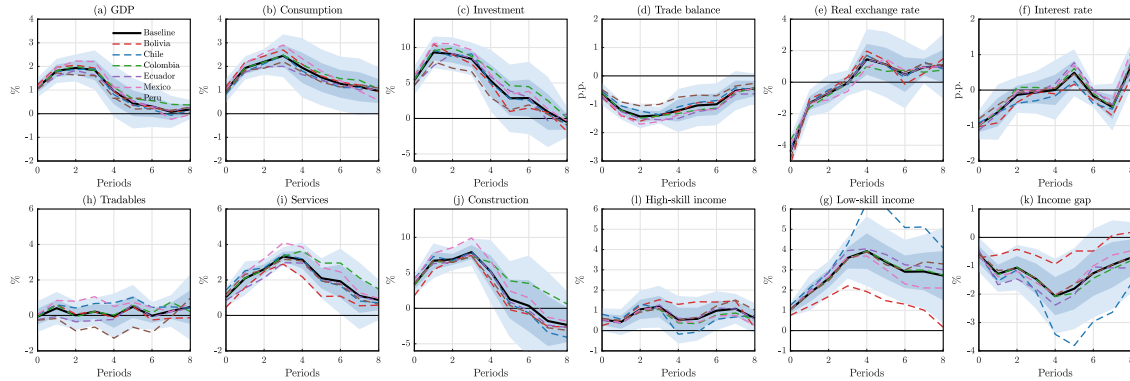
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when including a set of additional macroeconomic controls: 1 lag of GDP, Consumption, Investment, Trade-balance to GDP ratio, real exchange rate and EMBI. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.18: DYNAMICS AROUND COMMODITY BOOMS - COUNTRY SPECIFIC TRENDS



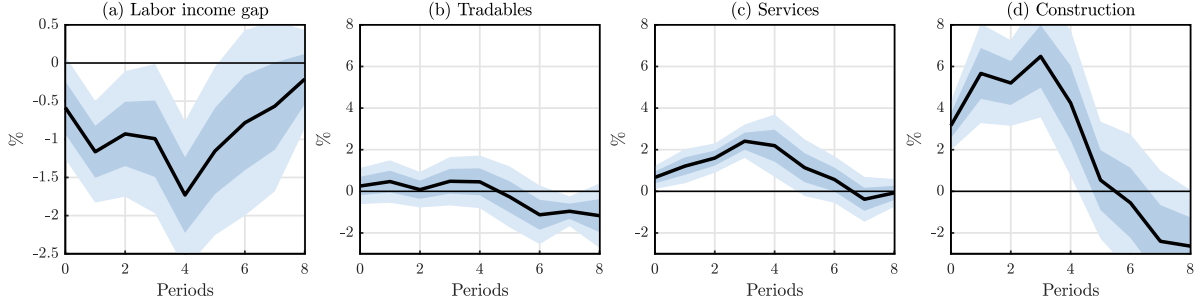
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; dashed red lines are the responses when including country-specific trends. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.19: DYNAMICS AROUND COMMODITY BOOMS - OUTLIERS



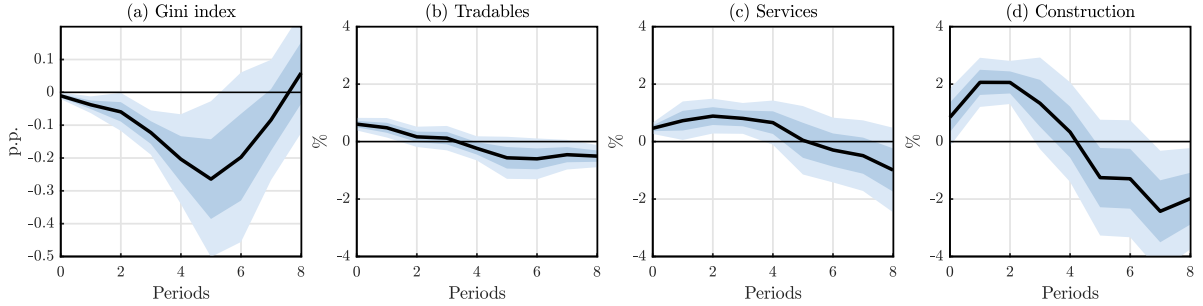
Notes: This figure plots the response of (a) GDP, (b) Consumption, (c) Investment, (d) Trade balance to GDP ratio, (e) Real exchange rate, (f) EMBI, (g) Tradable output, (h) Services output, (i) Construction output, (j) High-skill labor income, (k) Low-skill labor income and (l) labor income gap to a 10% change in commodity prices. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Solid black lines are the impulse responses in the baseline case; the colour lines are the point estimates obtained when dropping that each specific country from the sample. Error bands represent 68% and 90% confidence intervals in the baseline case.

Figure B.20: Extended sample (Latin America)



Notes: This figure plots the response of labor income inequality and sectoral GDP to a 10% change in commodity prices in an extended Latin American sample that adds Argentina, Brazil, Paraguay, and Uruguay to the baseline 6 countries. Panel (a) shows the labor income gap; panels (b)–(d) show tradable, services, and construction output, respectively. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Sectoral GDP responses are expressed as cumulative percentage deviations from the pre-shock level. Error bands represent 68% and 90% confidence intervals.

Figure B.21: Extended sample (commodity exporters)



Notes: This figure plots the response of the Gini coefficient and sectoral GDP to a 10% change in commodity prices in a global sample of 72 commodity-exporting economies for the period 1992–2019. Panel (a) shows the Gini index; panels (b)–(d) show tradable, services, and construction output, respectively. Each plot shows the coefficient β^h obtained by running Equation (1) in the text for different horizons h . Sectoral GDP responses are expressed as cumulative percentage deviations from the pre-shock level. Error bands represent 68% and 90% confidence intervals.

B.4. Additional Evidence on Commodity prices and spreads

The specialized literature has found the existence of a strong negative comovement of interest rates spreads and commodity prices ⁵⁷. To provide further evidence on this link, I run a regression of the real interest rate spreads on the commodity price index for my panel of Latin American commodity exporters. I follow the same specification as in [Drechsel and Tenreyro \(2018\)](#):

$$r_{i,t} - r_t^* = \alpha_i + \xi \left(\ln p_{i,t}^{Co} - \ln \bar{p}_i^{\bar{Co}} \right) + \beta X_{i,t} + v_{i,t}, \quad (\text{B.1})$$

where $r_{i,t}$ is the real domestic lending rate of country i in year t , r_t^* is measure of the world interest rate, the commodity price index $p_{i,t}^{Co}$ is expressed in log deviations from its mean, and $X_{i,t}$ is a set of control variables. Table B.7 and B.8 shows results for a panel regression and individual regressions by country when using the EMBI as a proxy for $r_{i,t} - r_t^*$; Table B.9 shows results for a panel regression when using the same measure of spread used in [Drechsel and Tenreyro \(2018\)](#).

Table B.7: EMBI AND COMMODITY PRICES - REGRESSIONS RESULTS

EMBI	(1)	(2)	(3)	(4)	(5)
Commodity Prices	-0.144*** (0.019)	-0.133*** (0.020)	-0.137*** (0.020)	-0.114*** (0.021)	-0.111*** (0.027)
GDP growth		-0.401** (0.171)			-0.185 (0.211)
Trade Balance			-0.082 (0.100)		-0.162 (0.116)
NFA				-0.001*** (0.000)	-0.001* (0.000)
Constant	0.573*** (0.012)	0.585*** (0.011)	0.573*** (0.015)	0.572*** (0.015)	0.572*** (0.009)
Observations	136	136	136	136	136
Overall R-squared	0.261	0.276	0.278	0.303	0.322
Standard errors in parentheses					
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$					

Notes: Results from estimating Equation (B.1). I use the EMBI as a proxy for the difference between $r_{i,t}$ and r_t^* . The commodity price index is in log deviations from the mean. Trade balance and net foreign assets (NFA) are expressed as percentage of GDP. All variables are in annual terms. Sample period is 1992-2019.

⁵⁷See [Bastourre et al. \(2012\)](#), [Drechsel and Tenreyro \(2018\)](#), [Fernández et al. \(2018\)](#), [Shousha \(2016\)](#), among others.

Table B.8: EMBI AND COMMODITY PRICES - REGRESSIONS RESULTS BY COUNTRY

EMBI	BOL	CHL	COL	ECU	MEX	PER
Commodity Prices	-0.204*** (0.057)	-0.009 (0.036)	-0.192*** (0.036)	-0.046 (0.035)	-0.094** (0.035)	-0.226*** (0.031)
Constant	0.621*** (0.013)	0.497*** (0.009)	0.577*** (0.008)	0.670*** (0.010)	0.552*** (0.008)	0.569*** (0.007)
Observations	22	20	22	24	26	22
R-squared	0.410	0.043	0.612	0.235	0.242	0.735
Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$						

Notes: Results from estimating $r_t - r_t^* = \alpha + \xi (\ln p_t^{Co} - \ln p_t^{\bar{Co}}) + v_t$ for each individual country . I use the EMBI as a proxy for the difference between $r_{i,t}$ and r_t^* . The commodity price index is in log deviations from the mean. All variables are in annual terms. Sample period is 1992-2019.

Table B.9: LENDING RATE AND COMMODITY PRICES - REGRESSIONS RESULTS

EMBI	(1)	(2)	(3)	(4)	(5)
Commodity Prices	-0.131*** (0.024)	-0.125*** (0.025)	-0.088*** (0.025)	-0.075*** (0.026)	-0.083** (0.038)
GDP growth	0.010 (0.017)	0.007 (0.017)	0.018 (0.016)	0.021 (0.016)	0.026 (0.024)
Trade Balance			-0.558*** (0.128)		-0.429** (0.182)
Debt_GDP				-0.001*** (0.000)	-0.001 (0.000)
Constant	0.100*** (0.033)	0.112*** (0.036)	0.094** (0.046)	0.104** (0.046)	0.082*** (0.014)
Observations	133	133	133	133	133
Overall R-squared	0.109	0.0925	0.167	0.144	0.193
Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$					

Notes: Results from estimating Equation (B.1). The lending rate spread is calculated following Drechsel and Tenreyro (2018), as the difference between a real domestic lending rate and the UK real rate. The commodity price index is in log deviations from the mean. Trade balance and net foreign assets (NFA) are expressed as percentage of GDP. All variables are in annual terms. Sample period is 1992-2019. Ecuador is excluded from the sample since there is no available data for domestic lending rates during the period considered.

C. Model details

C.1. Propositions

Proposition 1 (Characterization of skill intensity). *Under perfect labor mobility, the following hold for any two sectors A and B :*

1. Characterization: $\frac{l_t^{H,A}}{l_t^{L,A}} > \frac{l_t^{H,B}}{l_t^{L,B}}$ if and only if $\theta_A > \theta_B$.
2. Parameter ordering: $\theta_A > \theta_B$ implies $\alpha_A \theta_A > \alpha_B \theta_B$ whenever

$$\frac{\alpha_A}{\alpha_B} > \frac{\theta_B}{\theta_A}. \quad (\text{P.1})$$

This result generalizes to N sectors.

Proof. From the Cobb-Douglas production function

$$y_t^s = a^s \left[\left(l_t^{H,s} \right)^{\theta_s} \left(l_t^{L,s} \right)^{1-\theta_s} \right]^{\alpha_s} (k_t^s)^{1-\alpha_s},$$

the first-order conditions for labor demand in sector s are:

$$w_t^H = p_t^s \alpha_s \theta_s \frac{y_t^s}{l_t^{H,s}}, \quad (\text{P.2})$$

$$w_t^L = p_t^s \alpha_s (1 - \theta_s) \frac{y_t^s}{l_t^{L,s}}. \quad (\text{P.3})$$

Dividing (P.2) by (P.3) and rearranging:

$$\frac{l_t^{H,s}}{l_t^{L,s}} = \frac{\theta_s}{1 - \theta_s} \cdot \frac{w_t^L}{w_t^H}. \quad (\text{P.4})$$

Under perfect labor mobility, w_t^H and w_t^L are common across sectors, so w_t^L/w_t^H is identical for A and B . Therefore:

$$\frac{l_t^{H,A}}{l_t^{L,A}} > \frac{l_t^{H,B}}{l_t^{L,B}} \iff \frac{\theta_A}{1 - \theta_A} > \frac{\theta_B}{1 - \theta_B} \iff \theta_A > \theta_B, \quad (\text{P.5})$$

where the last equivalence holds because $\theta_s/(1 - \theta_s)$ is strictly increasing in $\theta_s \in (0, 1)$. So the employment ratio ordering is equivalent to $\theta_A > \theta_B$, regardless of the α 's.

It remains to determine when $\theta_A > \theta_B$ implies $\alpha_A \theta_A > \alpha_B \theta_B$. This requires:

$$\alpha_A \theta_A > \alpha_B \theta_B \iff \frac{\alpha_A}{\alpha_B} > \frac{\theta_B}{\theta_A}.$$

Since $\theta_A > \theta_B > 0$, we have $\theta_B/\theta_A \in (0, 1)$. The condition (P.1) therefore places a lower bound on the ratio of labor shares: α_A cannot be too small relative to α_B . Combining with (P.5), $\frac{l_t^{H,A}}{l_t^{L,A}} > \frac{l_t^{H,B}}{l_t^{L,B}}$ is sufficient for $\alpha_A\theta_A > \alpha_B\theta_B$ if and only if P.1 holds. $\square$

Corollary 1 (Equal labor shares). *If $\alpha_A = \alpha_B$, then condition (P.1) reduces to $1 > \theta_B/\theta_A$, which is automatically satisfied whenever $\theta_A > \theta_B$. Therefore, under equal labor shares, the employment ratio ordering $\frac{l_t^{H,A}}{l_t^{L,A}} > \frac{l_t^{H,B}}{l_t^{L,B}}$ is sufficient for $\alpha_A\theta_A > \alpha_B\theta_B$ without any additional restriction.*

Corollary 2 (Unequal labor shares). *If $\alpha_A \neq \alpha_B$, the employment ratio ordering alone is not sufficient. The additional condition $\alpha_A/\alpha_B > \theta_B/\theta_A$ must hold. Since $\theta_B/\theta_A \in (0, 1)$, this condition is compatible with $\alpha_A < \alpha_B$, provided the gap between θ_A and θ_B is large enough to compensate.*

Remark. *In this paper, the three sectors are $s \in \{T, S, C\}$ and the assumption is $\alpha_S\theta_S > \alpha_T\theta_T > \alpha_C\theta_C$. The employment ratio ordering $\frac{l_t^{H,S}}{l_t^{L,S}} > \frac{l_t^{H,T}}{l_t^{L,T}} > \frac{l_t^{H,C}}{l_t^{L,C}}$ holds in the data. By Corollary 2, verifying that this is sufficient for the parameter ordering requires checking (P.1) for each pair of sectors. Since α_s and θ_s are both pinned down by the calibration, this condition is verified numerically and holds for all three pairwise comparisons (S, T) , (T, C) , and (S, C) .*

C.2. Equivalence Between Government Spending and Transfers

Proposition 2. Consider an economy with no sovereign wealth fund ($F_t = 0$ for all t), where the government levies a tax $\tau^{Co} \in [0, 1]$ on the capitalist's commodity income, generating revenue $rev_t = \tau^{Co} p_t^{Co} y^{Co}$. Let $n^H \equiv (1 - \kappa)(1 - \mu)$ and $n^L \equiv (1 - \kappa)\mu$ denote the population shares of high- and low-skill workers. Define two policies for the use of rev_t :

- **Policy A** (Government spending): $p_t^G G_t = rev_t$, no transfers ($T_t^H = T_t^L = 0$).
- **Policy B** (Transfers to workers):

$$n^H T_t^H + n^L T_t^L = rev_t, \quad (C.1)$$

no gov. spending ($G_t = 0$).

Then, Policies A and B generate identical competitive equilibrium paths for all prices and aggregate quantities: $\{GDP_t, c_t + G_t, i_t, \eta_t, p_t, p_t^S, p_t^C, p_t^I, r_t, d_t, w_t^H, w_t^L, Y_t^s\}_{t=0}^\infty$ for $s \in \{T, S, C\}$ if and only if: (i) both worker types are hand-to-mouth, (ii) the government's spending aggregator uses the same CES technology ($\varphi^G = \varphi, \varepsilon^G = \varepsilon^c$), and (iii) preferences are GHH.

Proof. The proof proceeds in six steps. In what follows, superscripts A and B index equilibrium objects under Policies A and B, respectively.

Step 1: The capitalist's problem is identical. Under both policies, the capitalist receives after-tax commodity income $(1 - \tau^{Co}) p_t^{Co} y^{Co} / \kappa$. The budget constraint,

$$p_t c_t^k + p_t^I \sum_s i_t^s + (1 + r_{t-1}) d_{t-1}^k = d_t^k + \sum_s u_t^s k_t^s + \sum_s \Pi_t^s + (1 - \tau^{Co}) p_t^{Co} \frac{y^{Co}}{\kappa},$$

the capital-accumulation equations, and all associated first-order conditions are unchanged across policies. Hence, given the same price sequences, the capitalist's optimal plan $\{c_t^k, d_t^k, i_t^s, k_{t+1}^s\}$ satisfies the same system of equations under both policies.

Step 2: Aggregate worker consumption differs by exactly rev_t/p_t . Under Policy A, worker $j \in \{H, L\}$ is hand-to-mouth with no transfers:

$$p_t c_t^{j,A} = w_t^j l_t^j.$$

Under Policy B, worker j receives per-capita transfer T_t^j :

$$p_t c_t^{j,B} = w_t^j l_t^j + T_t^j.$$

Summing across worker types with population weights n^H and n^L :

$$n^H p_t c_t^{H,A} + n^L p_t c_t^{L,A} = n^H w_t^H l_t^H + n^L w_t^L l_t^L, \quad (C.2)$$

$$n^H p_t c_t^{H,B} + n^L p_t c_t^{L,B} = n^H w_t^H l_t^H + n^L w_t^L l_t^L + n^H T_t^H + n^L T_t^L. \quad (C.3)$$

Using the government budget constraint (C.1), we obtain

$$\left[n^H c_t^{H,B} + n^L c_t^{L,B} \right] - \left[n^H c_t^{H,A} + n^L c_t^{L,A} \right] = \frac{rev_t}{p_t}. \quad (\text{C.4})$$

Step 3: Total demand for the final consumption good is identical. Define total absorption as $\tilde{c}_t \equiv c_t + G_t$, where

$$c_t = \kappa c_t^k + n^H c_t^{H,H} + n^L c_t^{L,L}$$

is aggregate private consumption. Under condition (ii), $p_t^G = p_t$, so $G_t^A = rev_t/p_t$. Hence:

$$\tilde{c}_t^A = \kappa c_t^k + n^H c_t^{H,A} + n^L c_t^{L,A} + \frac{rev_t}{p_t}.$$

Under Policy B ($G_t^B = 0$):

$$\tilde{c}_t^B = \kappa c_t^k + n^H c_t^{H,B} + n^L c_t^{L,B} = \kappa c_t^k + n^H c_t^{H,A} + n^L c_t^{L,A} + \frac{rev_t}{p_t},$$

where the last equality uses (C.4). Hence $\tilde{c}_t^A = \tilde{c}_t^B$ for all t .

Step 4: Derived demand for intermediate inputs is identical. Because the government's spending aggregator uses the same CES technology as the private final consumption-good producer, total demand for tradable and service inputs depends on total absorption $\tilde{c}_t$ alone:

$$c_t^S = \varphi \left(\frac{p_t}{p_t^S} \right)^{\varepsilon_c} \tilde{c}_t, \quad c_t^T = (1 - \varphi) (p_t)^{\varepsilon_c} \tilde{c}_t.$$

Since $\tilde{c}_t^A = \tilde{c}_t^B$ (Step 3), derived demands for service and tradable inputs from the consumption side are identical across policies. Demand from the investment side depends on $\{i_t^s\}$, which is pinned down by the capitalist's problem (Step 1) and is also identical.

Step 5: Labor supply is identical. Under GHH preferences, worker j 's intratemporal optimality condition is

$$v^j (l_t^j)^\omega = \frac{w_t^j}{p_t}.$$

This condition is independent of consumption (and hence of transfers). Since wages and the consumption price index are determined by factor market equilibrium and goods market clearing—which are identical across policies (Steps 1, 3, and 4)—it follows that $l_t^{j,A} = l_t^{j,B}$ for all j and t .

Step 6: Remaining equilibrium conditions coincide. With $F_t = 0$ under both policies, the balance of payments and the debt-elastic interest rate equation depend only on the capitalist's debt d_t^k :

$$\begin{aligned} (1 + r_{t-1}) d_{t-1} &= d_t + t b_t, \\ r_t &= r^* + \psi [\exp(d_t - \bar{d}) - 1] - \xi [\ln p_t^{Co} - \ln \bar{p}^{Co}], \end{aligned}$$

where $d_t = \kappa d_t^k$. Since the capitalist's problem is identical (Step 1), so are d_t and r_t . The production side—intermediate goods firms' labor and capital demands, factor prices $\{w_t^H, w_t^L, u_t^s, p_t^S, p_t^C, p_t^I\}$ —depends only on factor supplies and goods demands, all of which are identical across policies.

Collecting Steps 1–6, the competitive equilibrium allocations and prices under Policies A and B coincide for all t . □ □

Remark (Necessary conditions). *The equivalence relies on three assumptions jointly:*

1. *Hand-to-mouth workers ($MPC = 1$ for both types), so that transfers are spent entirely on consumption within the period.*
2. *Common CES aggregator technology, so that the composition of demand across intermediate goods is the same whether spending originates from the government or from workers.*
3. *GHH preferences, so that the lump-sum transfer does not affect labor supply through a wealth effect.*

Relaxing any of these breaks the equivalence. If high-skilled workers can save (the Ricardian H extension), Policy B no longer generates unit MPC out of transfers, and aggregate demand differs. If the government's spending aggregator is different from the private consumption-good producer, the composition of intermediate demand diverges across policies. If preferences exhibit a wealth effect on labor supply, transfers alter labor supply even when wages are unchanged.

Remark (Distribution of transfers across worker types). *Under the conditions of Proposition 2, the allocation of transfers between high- and low-skilled workers is irrelevant for aggregate equilibrium outcomes. Any split $\{T_t^H, T_t^L\}$ satisfying (C.1) yields the same aggregate consumption, factor market equilibrium, and labor income gap η_t . This follows from the fact that both worker types have $MPC = 1$ and their consumption is mediated by the same CES final consumption-good producer.*

C.3. Microfounding the relationship between interest rate spreads and commodity prices

This section follows exactly from [Drechsel and Tenreyro \(2018\)](#) and has the goal to formally show that it is possible to derive a negative relationship between interest rate spreads and commodity prices.

Suppose there is a borrower who borrows amount d_t^* . With probability λ she is able to repay in full. With probability $1 - \lambda$ only a repayment smaller than the borrowed amount d_t^* can be made. This repayment is a fraction ϕ of commodity output $p_t^{Co} y^{Co}$ (equivalently, $p_t^{Co} y^{Co}$ can be thought of as collateral which the lender can seize when full repayment is not possible). The presence of a risk-neutral lender who herself can obtain funds at the risk-free rate r^* and who faces perfect competition will result in the following zero profit condition:

$$(1 + r^*) d_t^* = \lambda (1 + r_t) d_t^* + (1 - \lambda) \phi p_t^{Co} y^{Co},$$

which can be rearranged to

$$r_t = \frac{1 + r^*}{\lambda} - \frac{1 - \lambda}{\lambda d_t^*} \phi p_t^{Co} y^{Co} - 1$$

From this expression, it is evident that: $\frac{\partial r_t}{\partial p_t^{Co}} < 0$. This backs up the existence of the third term in equation (24). Also consistent with the formulation in (24), it is straightforward from here to show that $\frac{\partial r_t}{\partial d_t^*} > 0$.

C.4. Competitive equilibrium definition and system of equations

Definition 1 (*Competitive Equilibrium*) Given initial conditions $k_{-1}^T, k_{-1}^S, k_{-1}^C, d_{-1}^k$, and F_{-1} ; exogenous fiscal sequences for $\{\tau^{Co}, \chi, T_t^H, T_t^L\}_{t=0}^\infty$, and given an exogenous process for $\{p_t^{Co}\}_{t=0}^\infty$, a competitive equilibrium is a sequence of:

- Allocations: $\{\{c_t^j, l_t^j\}_{\forall j}, c_t^k, d_t^k, \{y_t^s, l_t^{H,s}, l_t^{L,s}, k_{t+1}^s, i_t^s\}_{\forall s}, c_t, c_t^S, c_t^T, i_t, x_t^C, x_t^T, G_t, G_t^S, G_t^T, F_t\}_{t=0}^\infty$
- Prices: $\{p_t, p_t^G, p_t^I, p_t^S, p_t^C, w_t^H, w_t^L, \{u_t^s\}_{\forall s}, r_t\}_{t=0}^\infty$, such that:
 1. Given prices, $\{c_t^j, l_t^j\}_{t=0}^\infty$ solve worker j 's problem.
 2. Given prices, $\{c_t^k, d_t^k, \{k_{t+1}^s, i_t^s\}_{\forall s}\}_{t=0}^\infty$ solve the capitalist's problem.
 3. Given prices, $\{l_t^{H,s}, l_t^{L,s}, k_t^s\}_{t=0}^\infty$ solve intermediate goods firms' problem in sector s .
 4. Given prices, $\{c_t^S, c_t^T\}_{t=0}^\infty$ solve final consumption-good producers' problem.
 5. Given prices, $\{x_t^C, x_t^T\}_{t=0}^\infty$ solve final investment-good producers' problem.
 6. Given $\{\tau^{Co}, \chi, T_t^H, T_t^L\}_{t=0}^\infty$ and prices, $\{G_t, G_t^S, G_t^T, F_t\}_{t=0}^\infty$ satisfy the government budget constraint and the SWF saving rule.
 7. All markets clear.

System of non-linear equations

Capitalist's problem

$$\lambda_t p_t = [c_t^k]^{-\sigma} \quad (\text{C.5})$$

$$\lambda_t = \beta(1 + r_t) E_t \{\lambda_{t+1}\} \quad (\text{C.6})$$

Worker's problem

$$\nu_H (l_t^H)^{\omega-1} = \frac{w_t^H}{p_t} \quad (\text{C.7})$$

$$\nu_L (l_t^L)^{\omega-1} = \frac{w_t^L}{p_t} \quad (\text{C.8})$$

$$p_t c_t^L = w_t^L l_t^L + T_t^L \quad (\text{C.9})$$

$$p_t c_t^H = w_t^H l_t^H + T_t^H \quad (\text{C.10})$$

$$\eta_t = \frac{w_t^H l_t^H}{w_t^L l_t^L} \quad (\text{C.11})$$

Final consumption good producer

$$c_t = \left[\varphi^{1/\varepsilon} (c_t^S)^{(\varepsilon-1)/\varepsilon} + (1 - \varphi)^{1/\varepsilon} (c_t^T)^{(\varepsilon-1)/\varepsilon} \right]^{\varepsilon/(\varepsilon-1)} \quad (\text{C.12})$$

$$c_t^S = \varphi \left(\frac{p_t}{p_t^S} \right)^\varepsilon c_t \quad (\text{C.13})$$

$$c_t^T = (1 - \varphi) (p_t)^{\varepsilon} c_t \quad (\text{C.14})$$

Final investment good producer

$$i_t = \left[\gamma^{1/\varepsilon_i} (x_t^C)^{1-1/\varepsilon_i} + (1 - \gamma)^{1/\varepsilon_i} (x_t^T)^{1-1/\varepsilon_i} \right]^{\frac{\varepsilon_i}{\varepsilon_i-1}} \quad (\text{C.15})$$

$$x_t^C = \gamma \left(\frac{p_t^I}{p_t^C} \right)^{\varepsilon_i} i_t \quad (\text{C.16})$$

$$x_t^T = (1 - \gamma) (p_t^I)^{\varepsilon_i} i_t \quad (\text{C.17})$$

Tradable production

$$y_t^T = a^T \left[\left(l_t^{H,T} \right)^{\theta_T} \left(l_t^{L,T} \right)^{1-\theta_T} \right]^{\alpha_T} \left(k_t^T \right)^{1-\alpha_T} \quad (\text{C.18})$$

$$w_t^H = \alpha_T \theta_T \frac{y_t^T}{l_t^{H,T}} \quad (\text{C.19})$$

$$w_t^L = \alpha_T (1 - \theta_T) \frac{y_t^T}{l_t^{L,T}} \quad (\text{C.20})$$

$$u_t^T = (1 - \alpha_T) \frac{y_t^T}{k_t^T} \quad (\text{C.21})$$

Services production

$$y_t^S = a^S \left[\left(l_t^{H,S} \right)^{\theta_S} \left(l_t^{L,S} \right)^{1-\theta_S} \right]^{\alpha_S} \left(k_t^S \right)^{1-\alpha_S} \quad (\text{C.22})$$

$$w_t^H = p_t^S \alpha_S \theta_S \frac{y_t^S}{l_t^{H,S}} \quad (\text{C.23})$$

$$w_t^L = p_t^S \alpha_S (1 - \theta_S) \frac{y_t^S}{l_t^{L,S}} \quad (\text{C.24})$$

$$u_t^S = p_t^S (1 - \alpha_S) \frac{y_t^S}{k_t^S} \quad (\text{C.25})$$

Construction production

$$y_t^C = a^C \left[\left(l_t^{H,C} \right)^{\theta_C} \left(l_t^{L,C} \right)^{1-\theta_C} \right]^{\alpha_C} \left(k_t^C \right)^{1-\alpha_C} \quad (\text{C.26})$$

$$w_t^H = p_t^C \alpha_C \theta_C \frac{y_t^C}{l_t^{H,C}} \quad (\text{C.27})$$

$$w_t^L = p_t^C \alpha_C (1 - \theta_C) \frac{y_t^C}{l_t^{L,C}} \quad (\text{C.28})$$

$$u_t^C = p_t^C (1 - \alpha_C) \frac{y_t^C}{k_t^C} \quad (\text{C.29})$$

Capital and investment in tradable sector

$$k_{t+1}^T = (1 - \delta)k_t^T + i_t^T - \frac{\phi^T}{2} \left(\frac{i_t^T}{k_t^T} - \delta \right)^2 k_t^T \quad (\text{C.30})$$

$$p_t^I = q_t^T \left[1 - \phi^T \left(\frac{i_t^T}{k_t^T} - \delta \right) \right] \quad (\text{C.31})$$

$$q_t^T = \beta E_t \left[\frac{\lambda_{t+1}}{\lambda_t} \left(u_{t+1}^T + q_{t+1}^T \left[(1 - \delta) - \frac{\phi^T}{2} \left(\frac{i_{t+1}^T}{k_{t+1}^T} - \delta \right)^2 + \phi^T \left(\frac{i_{t+1}^T}{k_{t+1}^T} - \delta \right) \frac{i_{t+1}^T}{k_{t+1}^T} \right] \right) \right] \quad (\text{C.32})$$

Capital and investment in service sector

$$k_{t+1}^S = (1 - \delta)k_t^S + i_t^S - \frac{\phi^S}{2} \left(\frac{i_t^S}{k_t^S} - \delta \right)^2 k_t^S \quad (\text{C.33})$$

$$p_t^I = q_t^S \left[1 - \phi^S \left(\frac{i_t^S}{k_t^S} - \delta \right) \right] \quad (\text{C.34})$$

$$q_t^S = \beta E_t \left[\frac{\lambda_{t+1}}{\lambda_t} \left(u_{t+1}^S + q_{t+1}^S \left[(1 - \delta) - \frac{\phi^S}{2} \left(\frac{i_{t+1}^S}{k_{t+1}^S} - \delta \right)^2 + \phi^S \left(\frac{i_{t+1}^S}{k_{t+1}^S} - \delta \right) \frac{i_{t+1}^S}{k_{t+1}^S} \right] \right) \right] \quad (\text{C.35})$$

Capital and investment in construction sector

$$k_{t+1}^C = (1 - \delta)k_t^C + i_t^C - \frac{\phi^C}{2} \left(\frac{i_t^C}{k_t^C} - \delta \right)^2 k_t^C \quad (\text{C.36})$$

$$p_t^I = q_t^C \left[1 - \phi^C \left(\frac{i_t^C}{k_t^C} - \delta \right) \right] \quad (\text{C.37})$$

$$q_t^C = \beta E_t \left[\frac{\lambda_{t+1}}{\lambda_t} \left(u_{t+1}^C + q_{t+1}^C \left[(1 - \delta) - \frac{\phi^C}{2} \left(\frac{i_{t+1}^C}{k_{t+1}^C} - \delta \right)^2 + \phi^C \left(\frac{i_{t+1}^C}{k_{t+1}^C} - \delta \right) \frac{i_{t+1}^C}{k_{t+1}^C} \right] \right) \right] \quad (\text{C.38})$$

Government

$$G_t = \left[(\varphi^G)^{1/\varepsilon^G} (G_t^S)^{1-1/\varepsilon^G} + (1 - \varphi^G)^{1/\varepsilon^G} (G_t^T)^{1-1/\varepsilon^G} \right]^{\varepsilon^G/(\varepsilon^G-1)}, \quad (\text{C.39})$$

$$G_t^S = \varphi^G \left(\frac{p_t^G}{p_t^S} \right)^{\varepsilon^G} G_t \quad (\text{C.40})$$

$$G_t^T = (1 - \varphi^G) (p_t^G)^{\varepsilon^G} G_t \quad (\text{C.41})$$

$$p_t^G G_t + n^H T_t^H + n^L T_t^L + F_t = rev_t + (1 + r^f) F_{t-1} \quad (\text{C.42})$$

$$rev_t = \tau^{Co} p_t^{Co} y^{Co} \quad (\text{C.43})$$

$$T_t^L = \frac{\zeta^g \pi^L}{n^L} rev_t \quad (\text{C.44})$$

$$T_t^H = \frac{\zeta^g (1 - \pi^L)}{n^H} rev_t \quad (\text{C.45})$$

$$F_t = \chi (rev_t - \overline{rev}) + (1 - \nu)(1 + r^f) F_{t-1} \quad (\text{C.46})$$

Market clearing + additional definitions

$$c_t = \kappa c_t^k + (1 - \kappa) (\mu c_t^L + (1 - \mu) c_t^H) \quad (\text{C.47})$$

$$i_t = \kappa (i_t^T + i_t^S + i_t^C) \quad (\text{C.48})$$

$$y_t^S = c_t^S + G_t^S \quad (\text{C.49})$$

$$y_t^C = x_t^C \quad (\text{C.50})$$

$$n^H l_t^H = l_t^{H,T} + l_t^{H,S} + l_t^{H,C} \quad (\text{C.51})$$

$$n^L l_t^L = l_t^{L,T} + l_t^{L,S} + l_t^{L,C} \quad (\text{C.52})$$

$$tb_t = y_t^T + p_t^{Co} y^{Co} - c_t^T - x_t^T - G_t^T \quad (\text{C.53})$$

$$p_t gdp_t = y_t^T + p_t^S y_t^S + p_t^C y_t^C + p_t^{Co} y^{Co} \quad (\text{C.54})$$

$$rer_t = 1/p_t \quad (\text{C.55})$$

$$d_{t-1} (1 + r_{t-1}) + F_t = d_t + tb_t + (1 + r^f) F_{t-1} \quad (\text{C.56})$$

Interest rate

$$r_t = r^* + \psi \left[e^{\tilde{d}_t - \bar{\tilde{d}}} - 1 \right] - \xi [\ln(p_t^{Co}) - \ln(\bar{p}^{Co})] \quad (\text{C.57})$$

$$\tilde{d}_t \equiv d_t - F_t \quad (\text{C.58})$$

Exogenous process

$$\ln(p_t^{Co}) = (1 - \rho_1 - \rho_2) \ln(p^{\overline{Co}}) + \rho_1 \ln(p_{t-1}^{Co}) + \rho_2 \ln(p_{t-2}^{Co}) + \varepsilon_t^{Co} \quad (\text{C.59})$$

C.5. Two-Sector Tradable-Nontradable Model

This appendix describes the two-sector tradable-nontradable (TNT) model considered as an alternative to the baseline in Section 4.4. The model collapses the baseline's three-sector structure into a standard TNT framework by merging the services and construction sectors into a single nontradable sector N . The key departure from the baseline is that final consumption and investment goods are now produced using the same two inputs — tradable and nontradable goods — so there is no longer a distinction between the nontradable good used for consumption and the one used for investment. All other features of the model remain unchanged.

The simplified production structure is as follows. Final consumption and investment goods are produced by competitive aggregators:

$$c_t = \left[\varphi^{1/\varepsilon_c} (c_t^N)^{1-1/\varepsilon_c} + (1 - \varphi)^{1/\varepsilon_c} (c_t^T)^{1-1/\varepsilon_c} \right]^{\frac{\varepsilon_c}{\varepsilon_c - 1}} \quad (\text{C.60})$$

$$i_t = \left[\gamma^{1/\varepsilon_i} (x_t^N)^{1-1/\varepsilon_i} + (1 - \gamma)^{1/\varepsilon_i} (x_t^T)^{1-1/\varepsilon_i} \right]^{\frac{\varepsilon_i}{\varepsilon_i - 1}} \quad (\text{C.61})$$

Intermediate goods are produced by two sectors $s \in \{T, N\}$ according to:

$$y_t^s = a^s \left[\left(l_t^{H,s} \right)^{\theta_s} \left(l_t^{L,s} \right)^{1-\theta_s} \right]^{\alpha_s} (k_t^s)^{1-\alpha_s}, \quad \alpha_s, \theta_s \in (0, 1) \quad (\text{C.62})$$

where c_t^N and x_t^N are nontradable inputs demanded by the consumption-good and investment-good producers, respectively. In equilibrium, market clearing for the nontradable good requires $y_t^N = c_t^N + x_t^N + G_t^N$, where G_t^N is government demand for nontradable goods. The model is calibrated using the same parameter values as in Section 4.1, with θ^N set to match the aggregate skilled labor share in the nontradable sector.

C.6. Model extensions

The baseline model makes several simplifying assumptions that keep the framework tractable while delivering the core mechanism linking commodity booms to labor-income inequality. In this section I relax some of these assumptions in turn. In each case I then discuss how the model responses change relative to the baseline.

C.6.1. Extension I: High-Skilled Workers Can Save

In the baseline model both worker types—high-skilled (H) and low-skilled (L)—are hand-to-mouth: they consume their entire labor income each period. Here, I relax this assumption for high-skilled workers, allowing them to borrow and lend internationally, while preserving the hand-to-mouth structure for low-skilled workers.

A practical challenge arises immediately. In the baseline model, stationarity of the external position is induced by a debt-elastic country interest rate: the spread over the world rate rises with aggregate external debt $\tilde{d}_t$, discouraging indefinite borrowing. This device pins down the *aggregate* level of debt in the economy when only the capitalist saves: $\tilde{d}_t = \kappa d_t^k$. Once the high-skilled worker is also allowed to hold bonds, the interest rate rule remains tied to aggregate debt and becomes silent on how that aggregate is split between the two agents: any distribution consistent with the aggregate debt identity is an equilibrium, and the model inherits a unit root in individual asset positions. I therefore follow [Cantore and Freund \(2021\)](#) and introduce quadratic portfolio-adjustment costs, which penalize deviations of the high-skilled worker's bond holdings from a target level. This device pins down the individual debt position in a parsimonious way—without altering the aggregate interest rate rule or the behavior of the capitalist—and preserves a well-defined, stationary equilibrium.

The high-skilled worker solves an intertemporal problem whose budget constraint includes debt-service payments and the portfolio-adjustment cost:

$$p_t c_t^H + (1 + r_{t-1}) d_{t-1}^H + \frac{\psi_H}{2} (d_t^H - \bar{d}^H)^2 = w_t^H l_t^H + d_t^H + T_t^H, \quad (\text{C.63})$$

where d_t^H denotes net foreign debt of the high-skilled worker (positive values indicate borrowing), $\bar{d}^H$ is the target debt level, and $\psi_H \geq 0$ governs the magnitude of the cost. As $\psi_H \rightarrow \infty$ the adjustment cost becomes prohibitive and the high-skilled worker reverts to hand-to-mouth behavior, recovering the baseline model exactly.

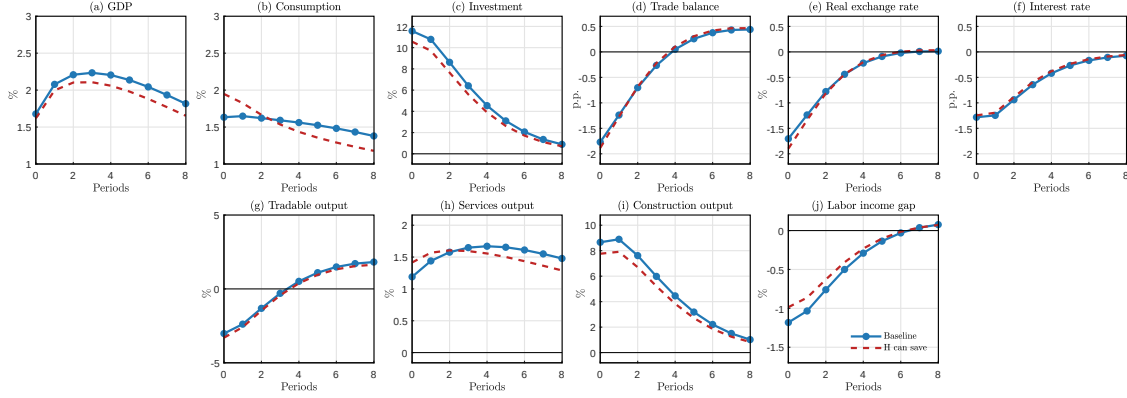
Since this extension abstracts from the SWF ($F_t = 0$), net aggregate external debt reduces to $\tilde{d}_t = d_t$. Relative to the baseline, the aggregate debt identity must now account for both saving agents:

$$\tilde{d}_t = \kappa d_t^k + (1 - \kappa)(1 - \mu) d_t^H. \quad (\text{C.64})$$

It is worth noting that this extension does not alter the steady state of the model: in steady state the adjustment cost vanishes, the Euler equation collapses to the standard $\beta(1+r) = 1$ condition, and all real allocations coincide with the baseline. The extension therefore affects only the dynamics of the economy following a shock, not the point around which those dynamics are computed.

I simulate the model setting $\psi_H = 0.001$, chosen small enough that the high-skilled worker can meaningfully smooth consumption in response to a commodity price shock, while remaining consistent with a well-behaved equilibrium.⁵⁸ Figure C.1 shows that allowing high-skilled workers to save amplifies the consumption response of the H type relative to the baseline: anticipating higher future wages, high-skilled workers borrow on impact of the commodity boom, front-loading consumption rather than waiting for the wage gains to materialize. This stronger consumption response, however, comes at the cost of lower investment: the rise in H borrowing pushes up aggregate debt, which tightens the debt-elastic interest rate and crowds out capital accumulation. The net effect on inequality is therefore attenuated relative to the baseline—the income gap falls by less, because the investment boom that drives construction demand and low-skilled wages is partially offset by the tighter financial conditions induced by H borrowing.

Figure C.1: MODEL IRFs: BASELINE VS. RICARDIAN



Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, (f) real interest rate, (g) tradable output, (h) services output, (i) construction output and (j) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the IRFs from the baseline model, the red dashed lines are the IRFs from the alternative model in which the high-skill workers can save. All variables are expressed in log deviations from steady state, except for the trade balance ratio and the real interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

⁵⁸Results are robust to alternative values of ψ_H ; as ψ_H increases the IRFs converge monotonically to the baseline.

C.6.2. Extension II: Labor Reallocation Costs

In the baseline model workers move costlessly across sectors in every period, so the economy adjusts instantaneously to any shock. Empirically, however, intersectoral reallocation can be slow and costly: workers face search, training, and mobility frictions when switching industries. To capture these frictions in a parsimonious way, I follow [Kohn et al. \(2021\)](#) and introduce quadratic reallocation costs that penalize changes in the sectoral composition of the labor force. In the short run, these costs generate wage differentials across sectors even for workers of the same skill type; in the long run they dissipate, restoring wage equalization within each skill group.

Let $j \in \{H, L\}$ index worker type and let $s_{k,t}^j \equiv l_{k,t}^j/l_t^j$ denote the share of type- j labor employed in sector $k \in \{T, S, C\}$. The reallocation cost incurred by a type- j worker is:

$$\mathcal{AC}_t^j = \frac{\phi^j}{2} \left[(s_{T,t}^j - s_{T,t-1}^j)^2 + (s_{C,t}^j - s_{C,t-1}^j)^2 \right], \quad (\text{C.65})$$

where $\phi^j \geq 0$ governs the magnitude of the friction. The cost is written in terms of two shares only; the service share $s_{S,t}^j = 1 - s_{T,t}^j - s_{C,t}^j$ is the residual and does not enter independently, without loss of generality.

The budget constraint of a representative type- j worker becomes:

$$p_t c_t^j + p_t \mathcal{AC}_t^j = w_{T,t}^j h_{T,t}^j + w_{S,t}^j h_{S,t}^j + w_{C,t}^j h_{C,t}^j + T_t^j, \quad (\text{C.66})$$

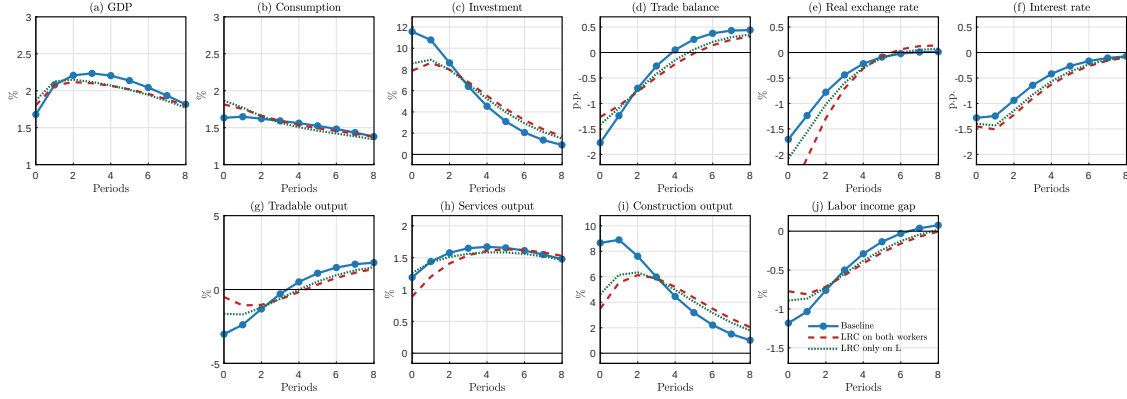
where $w_{k,t}^j$ is the sector-specific wage earned by type j in sector k . In the baseline a single economy-wide wage w_t^j prevailed for each type; with reallocation costs wages are allowed to differ across sectors. Setting $\phi^H = \phi^L = 0$ recovers the baseline model exactly. I simulate the model under two scenarios. In the first, only low-skill workers face reallocation costs ($\phi^H = 0, \phi^L = 25$). In the second, both worker types face symmetric costs ($\phi^H = \phi^L = 25$).⁵⁹

Figure [C.2](#) reports the results. The key takeaway is that labor reallocation costs slow down the adjustment of the economy to the commodity price shock but do not overturn the baseline result: inequality still falls on impact, driven by the same construction channel. When only low-skill workers face reallocation costs (green dotted lines), the fall in the labor income gap is more gradual than in the baseline. Two margins are at work: low-skill workers cannot move freely into the booming construction sector, limiting the upward pressure on w^L , and cannot exit freely from the tradable sector, where the Dutch-disease appreciation compresses labor demand. Since low-skill workers are intensively employed in both sectors, the friction binds precisely on the margins that matter most for the income gap, attenuating and delaying its compression. When both worker types face symmetric costs (red dashed

⁵⁹These values are chosen to illustrate the qualitative role of reallocation frictions rather than to match a specific empirical moment. A more rigorous quantitative analysis would require calibrating ϕ^j to replicate observed patterns of intersectoral labor mobility.

lines), the inequality-reducing effect of the commodity shock is attenuated even further: high-skill workers now also face frictions when moving into construction, so the sector expands by less on impact, and the economy is less able to restructure toward the booming sectors overall.

Figure C.2: LABOR REALLOCATION COSTS - MODEL IRFs



Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, (f) real interest rate, (g) tradable output, (h) services output, (i) construction output and (j) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the IRFs from the baseline model; the red dashed lines are the IRFs from the alternative model in which both high and low-skill workers are subject to labor reallocation costs; the green dotted lines are the IRFs from the alternative model in which only low-skill workers are subject to labor reallocation costs. All variables are expressed in log deviations from steady state, except for the trade balance ratio and the real interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

C.6.3. Extension III: Investment Basket

In the baseline model, investment goods are produced with inputs from the tradable and construction sector only. This assumption is convenient because it makes construction the sole channel through which investment demand spills over into the nontradable sector. However, it may understate the role of services: in practice, a non-negligible share of investment spending—architecture, engineering, consulting, logistics—involves nontradable service inputs. This extension enriches the investment basket by allowing it to draw on tradable goods, construction output, and nontradable services.

Under this specification, the CES aggregator takes the following form:

$$i_t = \left[\gamma_T^{1/\varepsilon_i} (x_t^T)^{1-1/\varepsilon_i} + \gamma_S^{1/\varepsilon_i} (x_t^S)^{1-1/\varepsilon_i} + \gamma_C^{1/\varepsilon_i} (x_t^C)^{1-1/\varepsilon_i} \right]^{\varepsilon_i/(\varepsilon_i-1)}, \quad \gamma_T + \gamma_S + \gamma_C = 1,$$

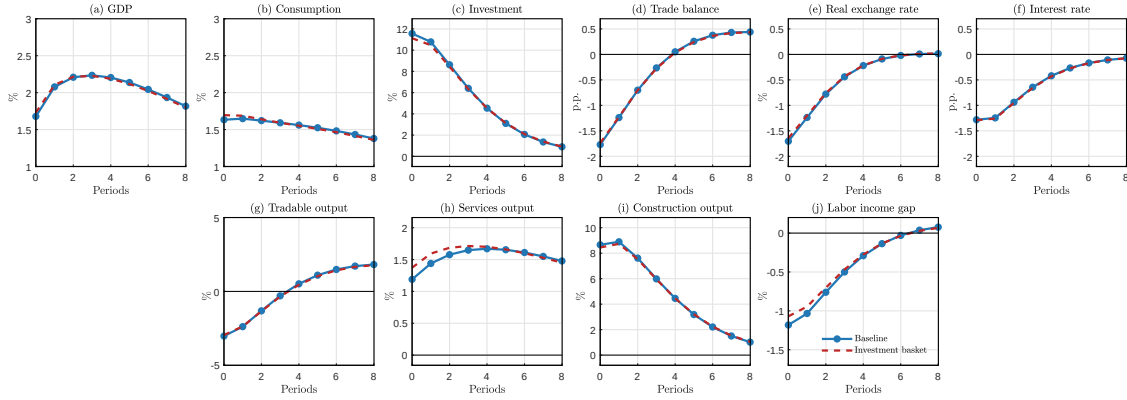
where x_t^S denotes the quantity of nontradable services used as an investment input. Setting $\gamma_S = 0$ and $\gamma_C = 1 - \gamma_T$ exactly recovers the baseline investment aggregator. With this structure, the market for services now has an additional source of demand from the investment

sector: $y_t^S = c_t^S + G_t^S + x_t^S$.

In the baseline calibration, $\gamma_T = 0.5$ and $\gamma_C = 0.5$. In this extension I maintain $\gamma_T = 0.5$ and set $\gamma_S = 0.07$, so that $\gamma_C = 0.43$. Following a commodity boom, investment demand is therefore split between the construction sector and the service sector, with the latter absorbing a share that was previously directed entirely toward construction.

Figure C.3 reports the results. The IRFs are remarkably close to the baseline across most aggregates, suggesting that the results are robust to this modification. The labor income gap, however, falls by slightly less than in the baseline. The mechanism is straightforward: by diverting part of the investment demand toward services—a skill-intensive sector—the extension weakens the construction boom relative to baseline. Since construction is the sector most intensive in low-skill labor, a smaller construction expansion translates into less upward pressure on w^L , attenuating the compression of the income gap.

Figure C.3: INVESTMENT AGGREGATOR INCLUDING SERVICES - MODEL IRFs



Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, (f) real interest rate, (g) tradable output, (h) services output, (i) construction output and (j) the labor income gap to a commodity price shock that raises $p_t^{C^o}$ by 10% on impact. The blue solid lines are the IRFs from the baseline model; the red dashed lines are the IRFs from the alternative model in which the investment aggregator includes inputs from the service sector. All variables are expressed in log deviations from steady state, except for the trade balance ratio and the real interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

C.6.4. Extension IV: Government Spending Aggregator

In the baseline model, the government's spending aggregator uses the same services weight φ as the household consumption-good producer. This assumption implies that, conditional on the same marginal propensity to spend, redirecting revenue between government expenditure and household transfers leaves aggregate non-tradable demand unchanged. Here, I relax this assumption by allowing the government to have a distinct basket weight φ^G , while keeping the household basket weight φ fixed.

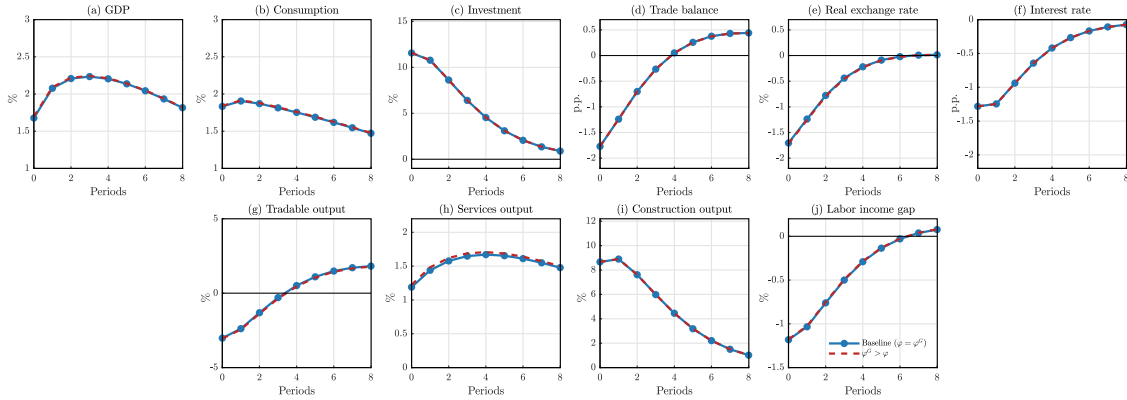
The government's CES expenditure basket takes the form:

$$G_t = \left[(\varphi^G)^{1/\varepsilon^G} (G_t^S)^{(\varepsilon^G-1)/\varepsilon^G} + (1 - \varphi^G)^{1/\varepsilon^G} (G_t^T)^{(\varepsilon^G-1)/\varepsilon^G} \right]^{\varepsilon^G/(\varepsilon^G-1)}, \quad (\text{C.67})$$

with associated demand equations $G_t^S = \varphi^G (p_t^G/p_t^S)^{\varepsilon^G} G_t$ and $G_t^T = (1 - \varphi^G) (p_t^G/p_t^T)^{\varepsilon^G} G_t$, where p_t^G is the government price index. Setting $\varphi^G = \varphi$ recovers the baseline exactly.

I simulate the model under $\varphi^G > \varphi$, so that the government spending aggregator is tilted toward services relative to the private final consumption-good producer. Figure C.4 shows that IRFs are remarkably close to the baseline across all aggregates, including the labor income gap. The reason is quantitative rather than qualitative: government spending accounts for a small share of GDP, so even a substantial reallocation of its basket toward services generates a negligible shift in aggregate non-tradable demand.

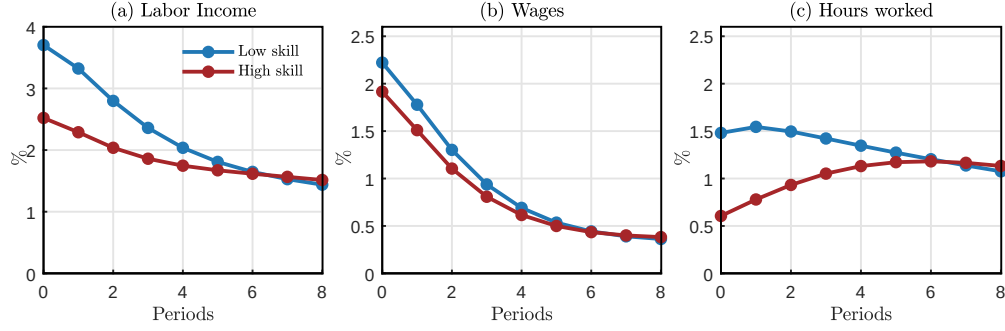
Figure C.4: ALTERNATIVE GOVERNMENT CONSUMPTION BASKET - MODEL IRFs



Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, (f) real interest rate, (g) tradable output, (h) services output, (i) construction output and (j) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the IRFs from the baseline model; the red dashed lines are the IRFs from the alternative model in which the government spending aggregator puts more weight on services compared with the households ($\varphi^G > \varphi$). All variables are expressed in log deviations from steady state, except for the trade balance ratio and the real interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

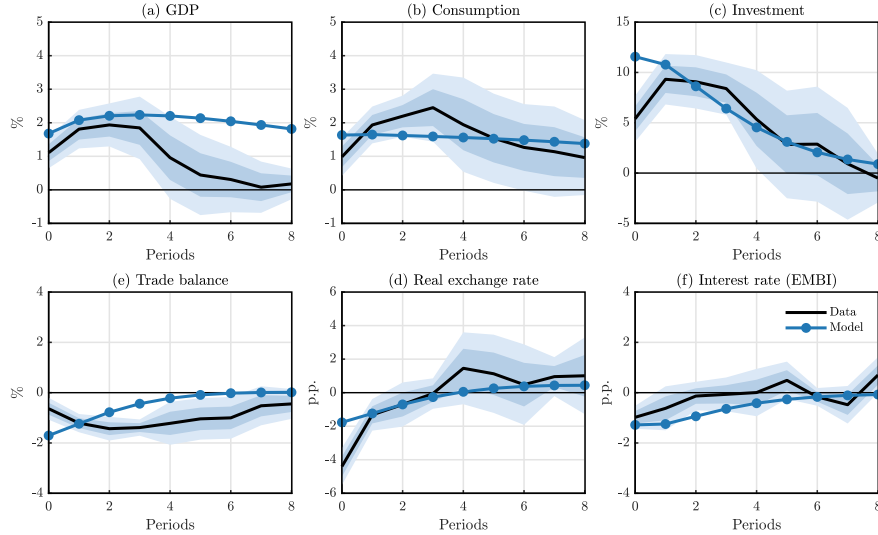
C.7. Additional figures

Figure C.5: LABOR INCOME, WAGES AND HOURS WORKED - MODEL IRFs



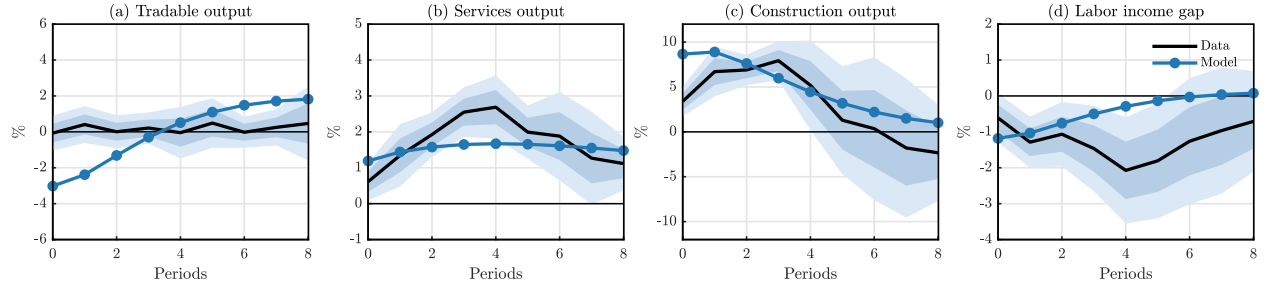
Notes: This figure plots the model-implied impulse response functions for (a) labor income, (b) wages, and (c) hours worked, to a commodity price shock that raises $p_t^{C_o}$ by 10% on impact for both high-skill (red solid lines) and low-skill workers (blue solid lines). All variables are expressed in log deviations from steady state. The time units on the horizontal axis are years.

Figure C.6: MACROECONOMIC DYNAMICS TO A COMMODITY PRICE SHOCK



Notes: This figure plots the impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, and (f) real interest rate to a commodity price shock that raises $p_t^{C_o}$ by 10% on impact. The blue solid lines are the model-implied IRFs; the black solid lines are the empirical IRFs generated in Section 2. Error bands represent 68% and 90% confidence intervals. All variables are expressed in log deviations from steady state, except for the trade balance ratio and interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

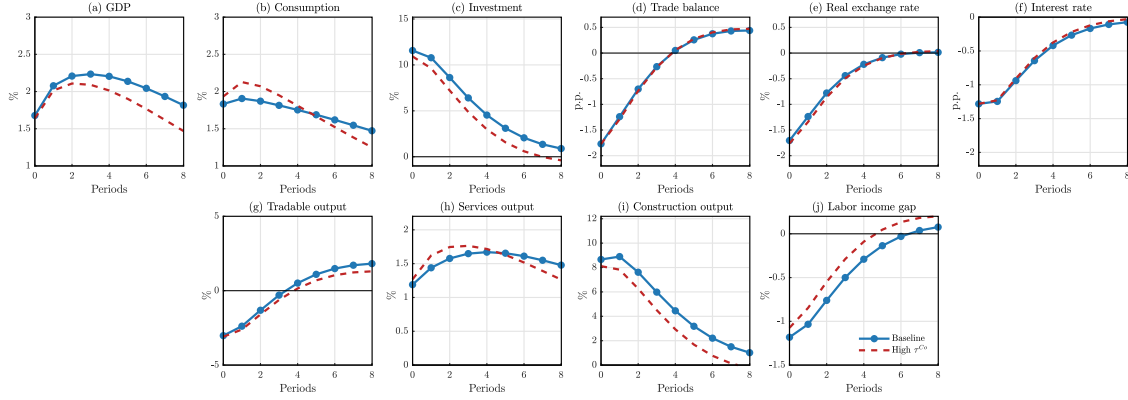
Figure C.7: SECTORAL AND LABOR INCOME DYNAMICS TO A COMMODITY PRICE SHOCK



Notes: This figure plots the impulse response functions for (a) tradable output, (b) services output, (c) construction output, and (d) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the model-implied IRFs; the black solid lines are the empirical IRFs generated in Section 2. Error bands represent 68% and 90% confidence intervals. All variables are expressed in log deviations from steady state. The time units on the horizontal axis are years.

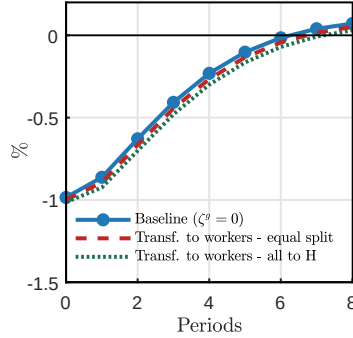
C.8. Additional figures from policy counterfactuals

Figure C.8: COUNTERFACTUAL I - ALTERNATIVE τ^{Co}



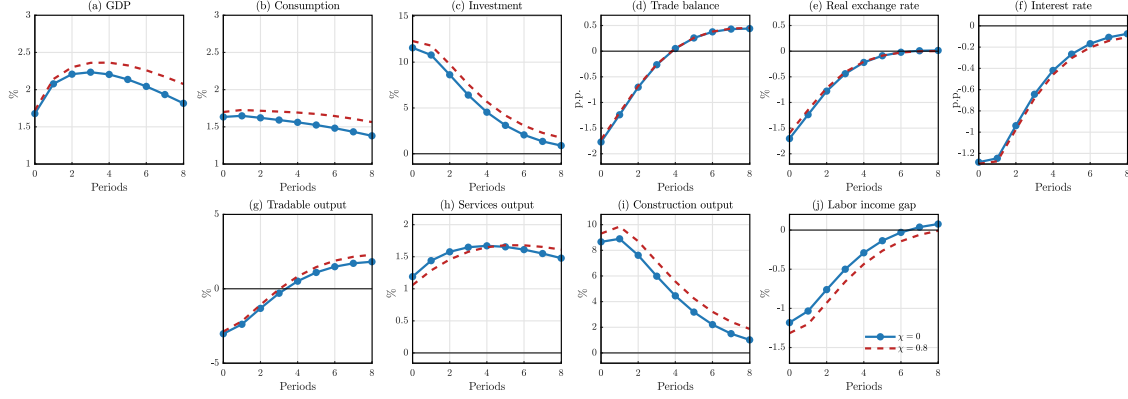
Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, (f) real interest rate, (g) tradable output, (h) services output, (i) construction output and (j) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the IRFs from the baseline model; red dashed lines correspond to an alternative parameterization with $\tau^{Co} = 1$. All variables are expressed in log deviations from steady state, except for the trade balance ratio and the real interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

Figure C.9: COUNTERFACTUAL II - H CAN SAVE - ALTERNATIVE TRANSFER SCHEME



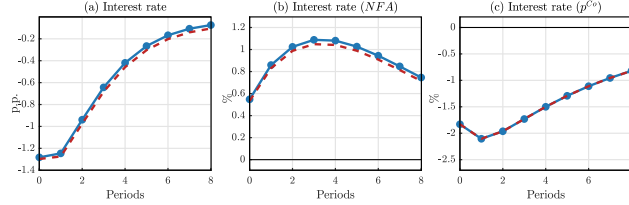
Notes: This figure plots the model-implied impulse response functions for the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The variable is expressed in log deviations from steady state. The time units on the horizontal axis are years. The blue solid line is the IRF from a model that allows high-skill workers to save and borrow, following the same setup as Appendix C.6.1. The benchmark sets $\zeta^g = 0$, so all commodity tax revenue is allocated to public spending and no transfers are made to workers. The two counterfactuals set $\zeta^g = 1$, redirecting all revenue to lump-sum transfers. They differ in the targeting parameter π^L , which governs the share of the transfer pool allocated to low-skill workers: the first counterfactual splits transfers equally across worker types ($\pi^L = 0.5$), while the second directs all transfers to high-skill workers ($\pi^L = 0$).

Figure C.10: COUNTERFACTUAL II - SOVEREIGN WEALTH FUND



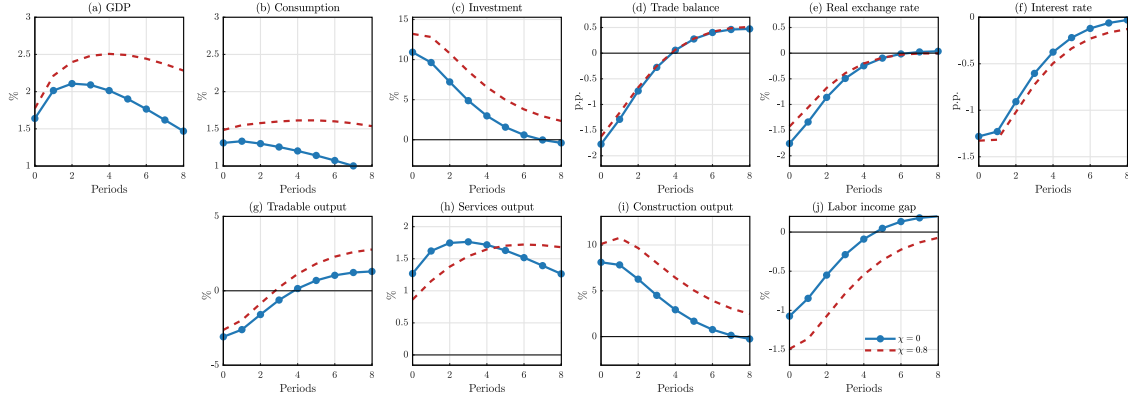
Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, (f) real interest rate, (g) tradable output, (h) services output, (i) construction output and (j) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the responses for the baseline case in which the government makes no savings in the SWF ($\chi = 0$); red dashed lines correspond to the case in which the government saves a fraction of its revenue in the SWF ($\chi = 0.8$). All variables are expressed in log deviations from steady state, except for the trade balance ratio and the real interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.

Figure C.11: COUNTERFACTUAL II - SWF - MODEL IRFs



Notes: This figure plots the model-implied impulse response functions for the real interest rate and its components to a commodity price shock that raises p_t^{Co} by 10% on impact. Panel (a) shows the full real interest rate $r_t = r^* + \psi[e^{\tilde{d}_t - \bar{d}} - 1] - \xi[\ln(p_t^{Co}) - \ln(\bar{p}^{Co})]$ (Equation 24); panel (b) shows the debt-elastic spread component $\psi[e^{\tilde{d}_t - \bar{d}} - 1]$; panel (c) shows the commodity price component $-\xi[\ln(p_t^{Co}) - \ln(\bar{p}^{Co})]$. The blue solid lines are the responses for the baseline case in which the government makes no savings in the SWF ($\chi = 0$); red dashed lines correspond to the case in which the government saves a fraction of its revenue in the SWF ($\chi = 0.8$). All variables are expressed in percentage-point deviations from steady state. The time units on the horizontal axis are years.

Figure C.12: COUNTERFACTUAL II - SOVEREIGN WEALTH FUND - BIG τ^{Co}



Notes: This figure plots the model-implied impulse response functions for (a) GDP, (b) consumption, (c) investment, (d) trade balance to GDP ratio, (e) real exchange rate, (f) real interest rate, (g) tradable output, (h) services output, (i) construction output and (j) the labor income gap to a commodity price shock that raises p_t^{Co} by 10% on impact. The blue solid lines are the responses for the baseline case in which the government makes no savings in the SWF ($\chi = 0$); red dashed lines correspond to the case in which the government saves a fraction of its revenue in the SWF ($\chi = 0.8$), under a higher commodity tax rate ($\tau^{Co} = 1$). All variables are expressed in log deviations from steady state, except for the trade balance ratio and the real interest rate, which are expressed in percentage-point deviations. The time units on the horizontal axis are years.