Structural transformation stalled:

The labour market costs of macroeconomic distress in Mozambique

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(1) Introduction

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Question: Does macroeconomic distress leave a structural imprint on the labour market – and where in the economy might we see it?

This paper

Case: Mozambique 1996–2023 in three phases – reconstruction (1996–2007), extractives boom (2008–2014), distress (2015–2023): hidden debts, Cabo Delgado, cyclones, COVID-19.

Method: extend the standard within–between decomposition of labour productivity growth, unpacking the between term into *distribution*, *scale* and *wage-cost* margins, each mapping to a specific class of determinants in the ST literature

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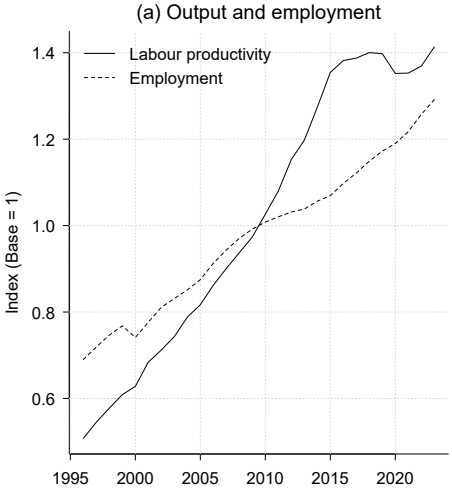
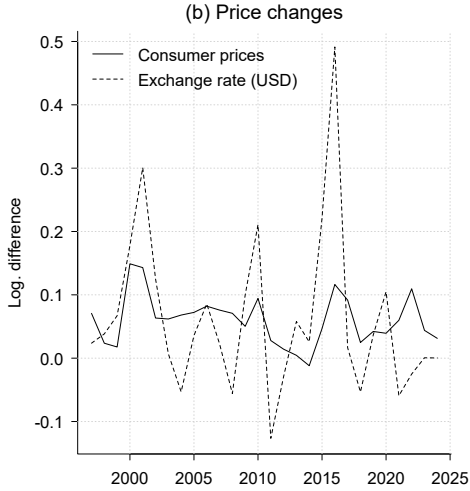
Main findings:

1. Post-2015 within-sector growth all but disappears; reallocation gains halve
2. The signature is a broad-based contraction of sectoral operating surpluses
3. Sectoral wage premia barely move $\Rightarrow$ price-type barriers are not the story
4. Upper bound: $\approx$1.2m workers and $\approx$1/3 of output per worker foregone by 2023

(2) Mozambique: a quick flavour

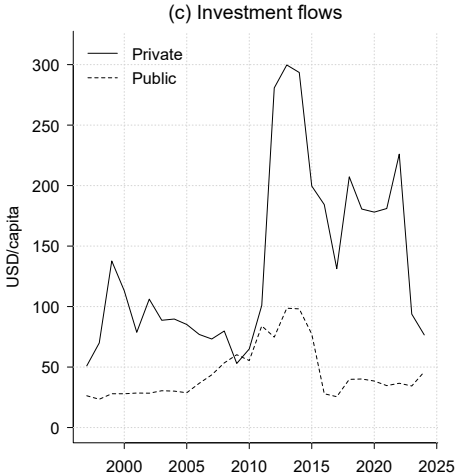
Three macroeconomic phases

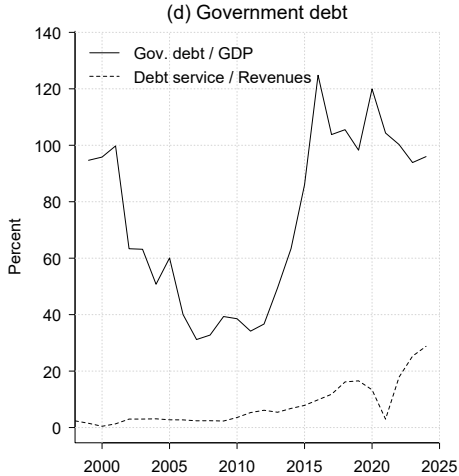




- Output per worker grew >5% p.a. to 2014, then stagnates; employment keeps growing
- 2016: sharp depreciation, inflation into the mid-teens

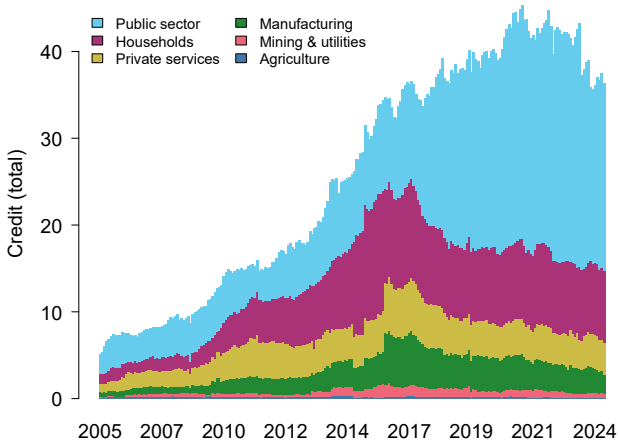
Investment boom, then fiscal squeeze





- Coal and Rovuma gas: private flows above USD 250 per capita by the early 2010s
- USD 2bn of undisclosed loans revealed 2015/16: IMF suspension, donor exit, debt >100% of GDP, public investment compressed

The banking system shifted from financing firms to financing the state



- Real credit to firms roughly halved after early 2016
- Credit to government rises sharply
- Private credit / deposits: ≈80% in 2015/16 to ≈40% today
- Firm surveys: manufacturers 'surviving not thriving'

Notes: gross credit by aggregate destination, 2016 constant prices. Source: own estimates from Banco de Moçambique monetary statistics.

(3) Methods and data

Step 1: the conventional within–between split

Aggregate labour productivity is the employment-weighted average of sectoral productivities, $y = \sum_j s_j y_j$. Totally differentiating:

$$\Delta \ln y \;\approx\; \underbrace{\sum_j v_j \Delta \ln y_j}_{\text{Within}} \;+\; \underbrace{\sum_j (v_j - s_j)\left(\Delta \ln L_j - \Delta \ln L\right)}_{\text{Between}}$$

- v_j output share, s_j employment share; Törnqvist weights
- **Between** operationalises structural transformation after McMillan et al. (2014)
- But it is a black box: how much reallocation contributed, not what made labour move

Step 2: a sectoral income identity opens the black box

Output is labour plus non-labour income, $Y_j = w_j L_j + \pi_j$, with $\theta_j \equiv w_j L_j / Y_j$.
Rearranging in logs:

$$\ln L_j = \underbrace{\ln\left(\frac{\theta_j}{1-\theta_j}\right)}_{\text{Distribution}} + \underbrace{\ln \pi_j}_{\text{Scale}} - \underbrace{\ln w_j}_{\text{Wage cost}}$$

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- With θ_j and w_j fixed, employment cannot have grown unless measured π_j grew – there is no other way for the books to balance
- π_j recovered residually: national accounts value added net of survey-based labour compensation, $\pi_j = (1 - \theta_j) Y_j$

Step 3: splitting the wage-cost margin

A rising w_j could be workforce upgrading *or* widening sector premia. A descriptive Mincer partition separates them:

$$\ln w_{ij} = \ln w_s + \beta h_{ij} + \kappa_j + \varepsilon_{ij}$$

- w_s: free-entry residual sector (subsistence agriculture); κ_j: premium net of observed human capital
- Measurement device, not a behavioural model – $\hat{\kappa}_j$ is not causal

Substituting into the between term:

$$\Delta y^B = \sum_j s_j \left(\frac{y_j}{y} - 1\right) \Big[\underbrace{\Delta \ln \tilde{\theta}_j^*}_{\text{Distribution}} + \underbrace{\Delta \ln \tilde{\pi}_j}_{\text{Scale}} - \underbrace{\left(\beta \Delta \bar{\tilde{h}}_j + \Delta \tilde{\kappa}_j\right)}_{\text{Wage cost}} \Big]$$

Data

Household surveys: IAF 1996/97, 2002/03; IOF 2007/08, 2014/15, 2022

- Harmonisation extends Jones & Tarp (2016) to all rounds; 2019/20 excluded (COVID-19 disrupted ≈1/4 of planned enumeration)
- Five sectors: agriculture (residual), mining & utilities, manufacturing, private services, public services

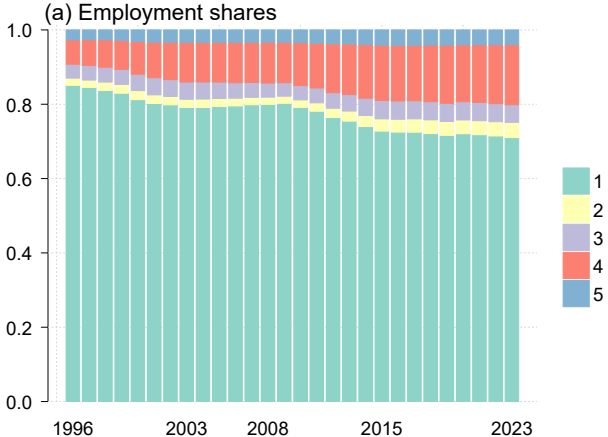
Mixed income attribution – the key measurement decision

- Mixed income proxied by consumption net of wage income; share α_j to labour (0.7 agriculture to 0.4 mining), apportioned by age and schooling
- Implied labour share ≈50% vs. ILO's 53%; robust to uniform $\alpha = 0.5, 0.6$ [backup]

National accounts: annual sectoral value added; inter-survey years filled by output-guided interpolation anchored on survey years

(4) Results

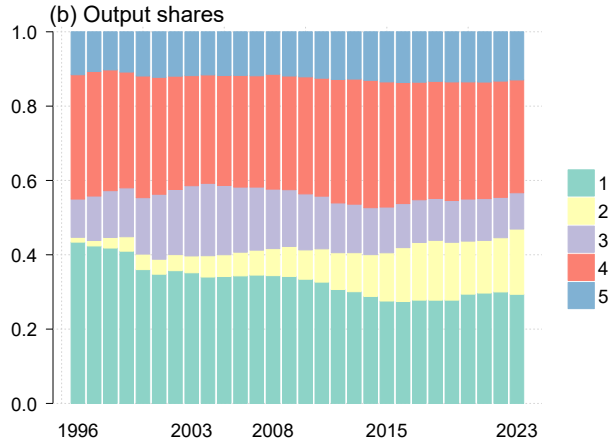
Agriculture still holds 71% of workers



- Agriculture: 85% to 71% over ≈30 years (≈0.5 pp/yr)
- China shed 1.2 pp/yr from ag. over 1980–2010, with far slower population growth
- Absolute agricultural employment rises, ≈5m to ≈7m
- Private services: <7% to 16%

Notes: employment shares by aggregate sector. 1 = Agriculture, 2 = Mining and utilities, 3 = Manufacturing, 4 = Private services, 5 = Public services.

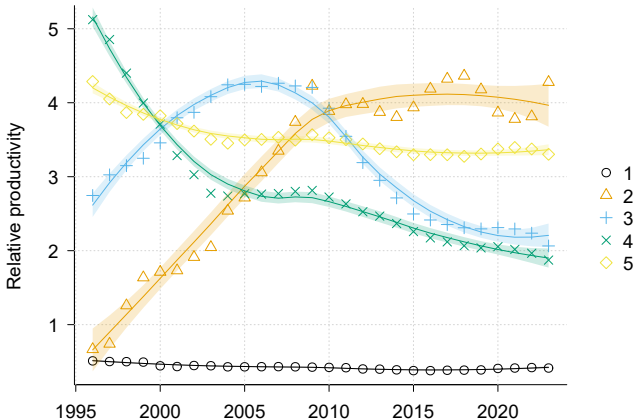
Output shares: the mining enclave



- Mining's output share jumps from ≈2010
- Its employment share barely moves
- Manufacturing and public services broadly flat
- Agriculture: ≈30% of output for 71% of workers

Notes: output (value added) shares by aggregate sector; 1 = Agriculture, 2 = Mining and utilities, 3 = Manufacturing, 4 = Private services, 5 = Public services.

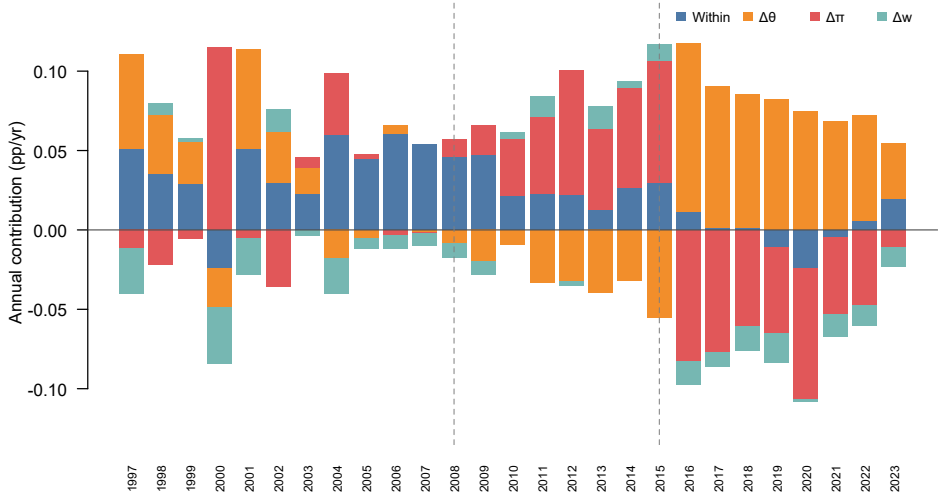
Relative productivity: convergence in the wrong direction



- Manufacturing peaks around 2007, then falls back
- Private services decline throughout
- Mining alone sustains a high and rising ratio
- Agriculture flat at $\approx$0.5 for three decades

Notes: output per worker by sector relative to the economy-wide average. Source: own estimates.

The decomposition, year by year



Three compositionally distinct phases

Period	Total	Within	Between	$\Delta\theta^*$	$\Delta\pi$	$-\Delta w$
1996–2007	5.20	3.77	1.43	1.73	0.72	−1.02
2008–2014	4.95	2.84	2.11	−2.49	4.39	0.21
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- **Boom**: strong surpluses boost reallocation ($\Delta\pi = 4.39$) – esp. in mining & private services
- **Bust**: growth collapses to 1.15 pp/yr; within-sector growth all but disappears; $\Delta\pi$ swings to -4.31, consistent across most sectors

Full decomposition results

Period	Sector	Total	Within	Between	$\Delta\theta^*$	$\Delta\pi$	$-\Delta w$
1996–2007	Agriculture	1.62	1.37	0.25	0.22	0.32	-0.30
	Mining & utilities	0.70	0.74	-0.05	-0.38	0.46	-0.14
	Manufacturing	1.41	1.41	-0.01	0.64	0.30	-0.95
	Private services	0.92	-0.15	1.07	1.02	-0.34	0.39
	Public services	0.56	0.40	0.16	0.22	-0.03	-0.03
	Total	**5.20**	**3.77**	**1.43**	**1.73**	**0.72**	**-1.02**
2008–2014	Agriculture	1.61	1.12	0.50	-0.38	0.94	-0.06
	Mining & utilities	0.95	0.55	0.40	-1.72	1.52	0.60
	Manufacturing	-0.00	-0.19	0.19	-0.40	0.12	0.47
	Private services	1.68	0.85	0.83	0.49	1.16	-0.82
	Public services	0.71	0.51	0.20	-0.48	0.65	0.02
	Total	**4.95**	**2.84**	**2.11**	**-2.49**	**4.39**	**0.21**
2015–2023	Agriculture	0.72	0.52	0.20	1.88	-1.38	-0.31
	Mining & utilities	0.73	0.34	0.39	0.31	0.01	0.07
	Manufacturing	-0.19	-0.21	0.02	0.98	-0.77	-0.19
	Private services	-0.25	-0.46	0.21	2.01	-1.50	-0.31
	Public services	0.14	0.14	0.00	0.93	-0.67	-0.26
	Total	**1.15**	**0.34**	**0.82**	**6.11**	**-4.31**	**-0.99**

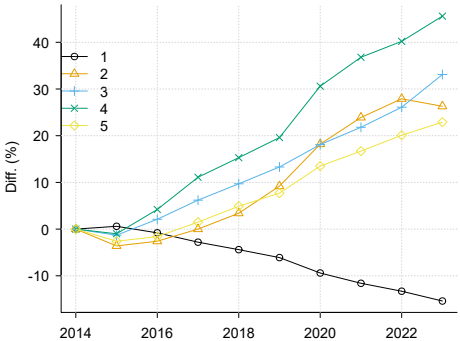
Counterfactual: what if pre-2015 surplus dynamics had continued?

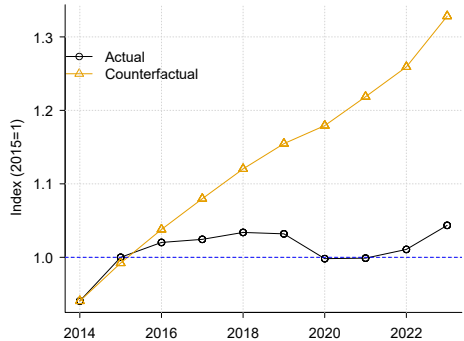
Exercise: extrapolate median 1997–2014 sector-specific $\Delta\pi$ and $\Delta\theta$ through 2023; hold wage costs, sectoral productivity and labour force growth at observed values; agriculture is the residual.

An upper bound, not a forecast

- Wages would rise as labour reallocated (suppressed here)
- Assumes no diminishing returns or declining match quality at the margin
- Pre-2015 dynamics were themselves partly boom-financed
- Abstracts from the non-debt shocks (Cabo Delgado, cyclones, COVID-19)
- Magnitude reflects the measured agricultural productivity gap

Counterfactual: employment and output per worker





Notes: (a) counterfactual minus actual employment by sector, %; (b) actual and counterfactual real output per worker, 2015 = 1.

- All four non-agricultural sectors absorb more labour; agriculture ≈20% smaller by 2023
- Up to 1.2 million workers who instead remained in low-productivity agriculture; output per worker ≈one third higher

(5) Conclusion

Takeaways

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4. **The magnitude is material**: an upper bound of $\approx$1.2m workers and $\approx$1/3 of output per worker foregone over eight years.

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Policy relevance

The standard **supply-side** menu – entry deregulation, training, business environment – does not match the observed signature. Restoring the conditions under which surpluses recover (demand, public investment, finance for non-extractive activities) does.

Where next

- The framework needs only national accounts and standard household surveys – available for most low- and middle-income countries
- Open question: is surplus contraction (rather than premium escalation) a general feature of crises in economies with large subsistence sectors?
- Extensions: cross-country application across crisis episodes; sub-national disaggregation; linking the scale margin to firm-level credit data

Thank you

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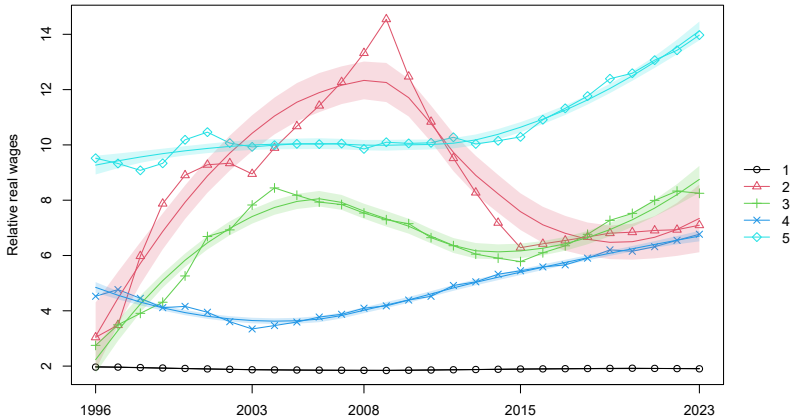
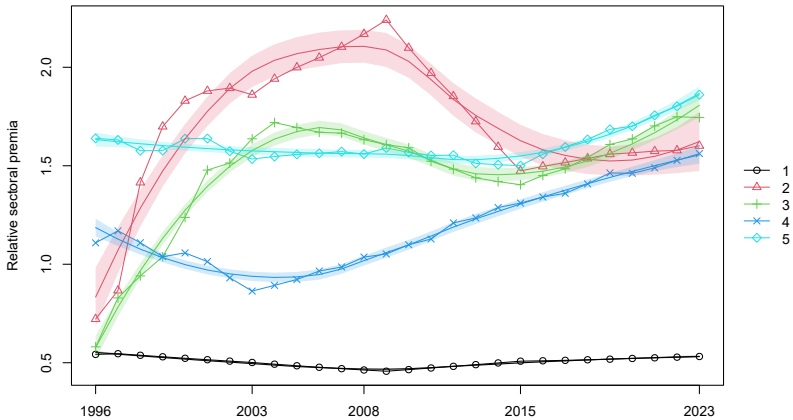
Backup: relative wages by sector



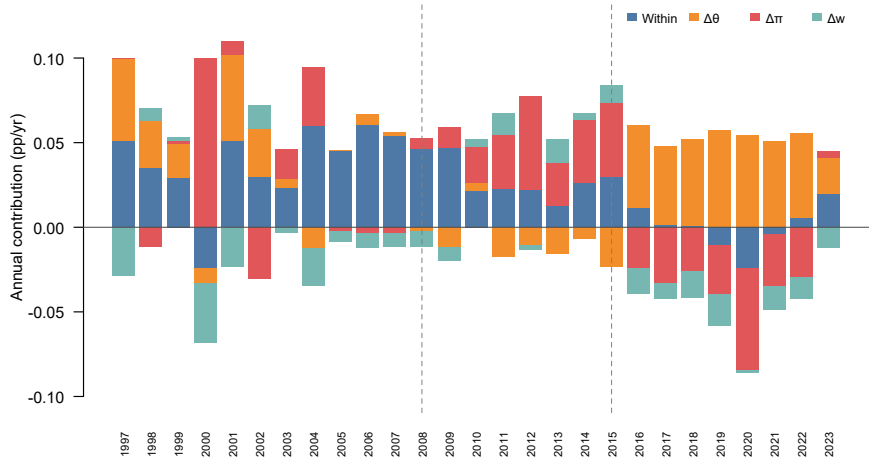
Notes: relative real labour incomes by sector, ratio of sectoral means to the reservation wage in agriculture. Source: own estimates.

Backup: sectoral wage premia



Notes: κ_j by sector, relative sectoral wage premia net of human capital differences. Source: own estimates.

Backup: robustness, $\alpha = 0.5$



Notes: main decomposition figure recomputed with $\alpha = 0.5$ in all sectors. Source: own estimates.

Backup: interpolation between survey rounds

Problem: surveys are 3–6 years apart; national accounts are annual.

- Linear interpolation would attribute genuine cyclical variation to smooth trends
- Output-guided alternative: linear path plus $\hat{\eta}_j \cdot \delta_{j,t}$, where $\delta_{j,t}$ is the deviation of log output from its own linear path
- Elasticities identified from survey-year pairs only; unit-elasticity fallback where implausible
- Survey years matched exactly ($\delta = 0$ at endpoints); nests linear interpolation
- Mean differences vs. linear interpolation under 1% in most sector-period cells