Search frictions and high unemployment in the South African labour market

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Outline

Motivation

Introduction

- The challenge of high unemployment is well-known and has been a persistent issue for South Africa since its transition to democracy.

- In an international context, one of South Africa's labour market challenge is similar to that of other developing countries $\Rightarrow$ **expanding formal wage employment**.

- But what's unique is that it additionally faces the challenge whereby those excluded from wage work are more likely to be unemployed rather than working in informal, own-account jobs $\Rightarrow$ **low self-employment**.

- In other EMDEs, unemployment rates are lower because those that do not find jobs in the formal sector are able to make some sort of livelihood in the informal sector $\Rightarrow$ **high self-employment**.

Motivation (cont.)

Introduction

• Existing debate has focused much on labour market regulations and institutions as potential challenges that could drive unemployment in South Africa.

• Alternative and less explored explanation is offered by the **search and matching theory**.

- The reason for persistent unemployment is costly search frictions (e.g., time, effort & resources) make it difficult for jobless workers to match with firms with vacancies.
- Search frictions also impede the reallocation of labour across firms or sectors, and may be amplified by different socio-economic characteristics.

This Paper

Introduction

- Research Question:
  - *To what extent can frictions in the South African labour market help explain the persistently high unemployment in the country?*
- Approach:
  - Build a search and matching model calibrated to match key moments of the South African labour market.
  - In particular, we calibrate our model to match transition flows between unemployment, wage employment and self-employment.
- Findings:
  - Existence of some complementarities between wage employment and self-employment.
  - Policy implications: the promotion of the expansion of formal wage employment may also stimulate self-employment.

Literature

- **Search frictions and macro labour models:**
  - The Diamond–Mortensen–Pissarides (DMP) framework: unemployment arises from search and matching frictions in the labour market (Diamond 1987; Mortensen and Pissarides 1994).
  - Extensions incorporate wage rigidity, firm heterogeneity, segmentation, and informality and/or self-employment, shaping cyclical dynamics in developing economies (Ulyssea 2018; Rud and Trapeznikova 2021; Poschke 2024).
- **Labour market hysteresis:**
  Temporary shocks can have persistent effects through skill loss, reduced matching efficiency, and firm exit, leading to structural unemployment and hindering a full return to previous employment levels (Gali 2022; Dadam and Viegi 2024).
- **Labor market frictions in developing countries:**
  - **Monopsony power:** Wage markdowns from low labor supply elasticities (Brooks et al. 2021; Bassier et al. 2022).
  - **Informality:** Taxes and regulations distort wages and sectoral choice (Ulyssea 2020).
  - **Human capital:** Frictions reduce returns to education and on-the-job skill accumulation (Abebe et al. 2021; Engbom 2022).

Monopsony power

Evidence

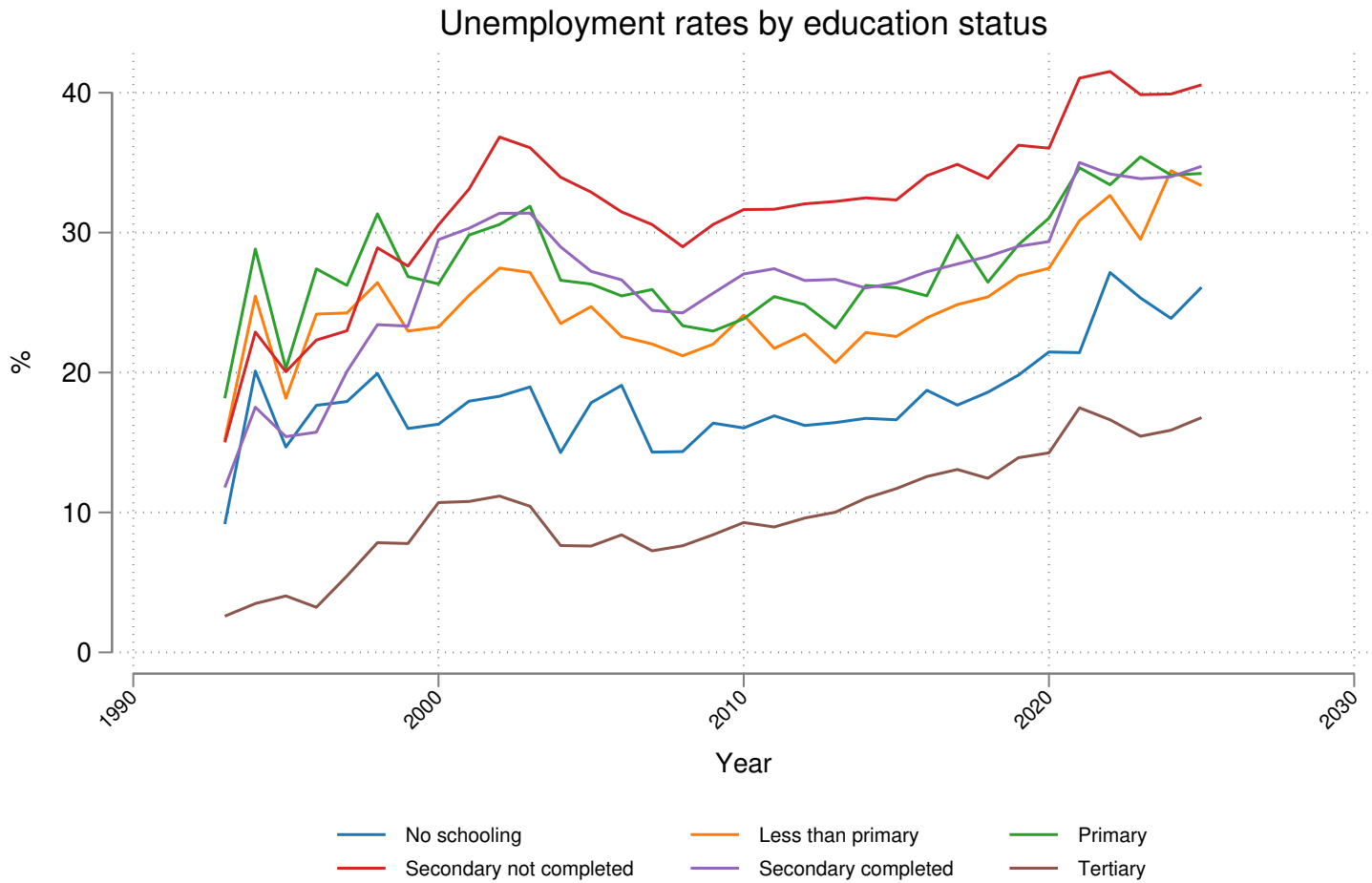
- **SF1**: Following Bassier (2019), using the matched employer-employee data from South Africa, the firm-level labor supply elasticity is estimated to be 0.75.

- **SF2**: Labour supply elasticity is also low for wholesale and retail (0.288), which suggests large monopsony power in one of the largest employment sectors in South Africa.

Human capital

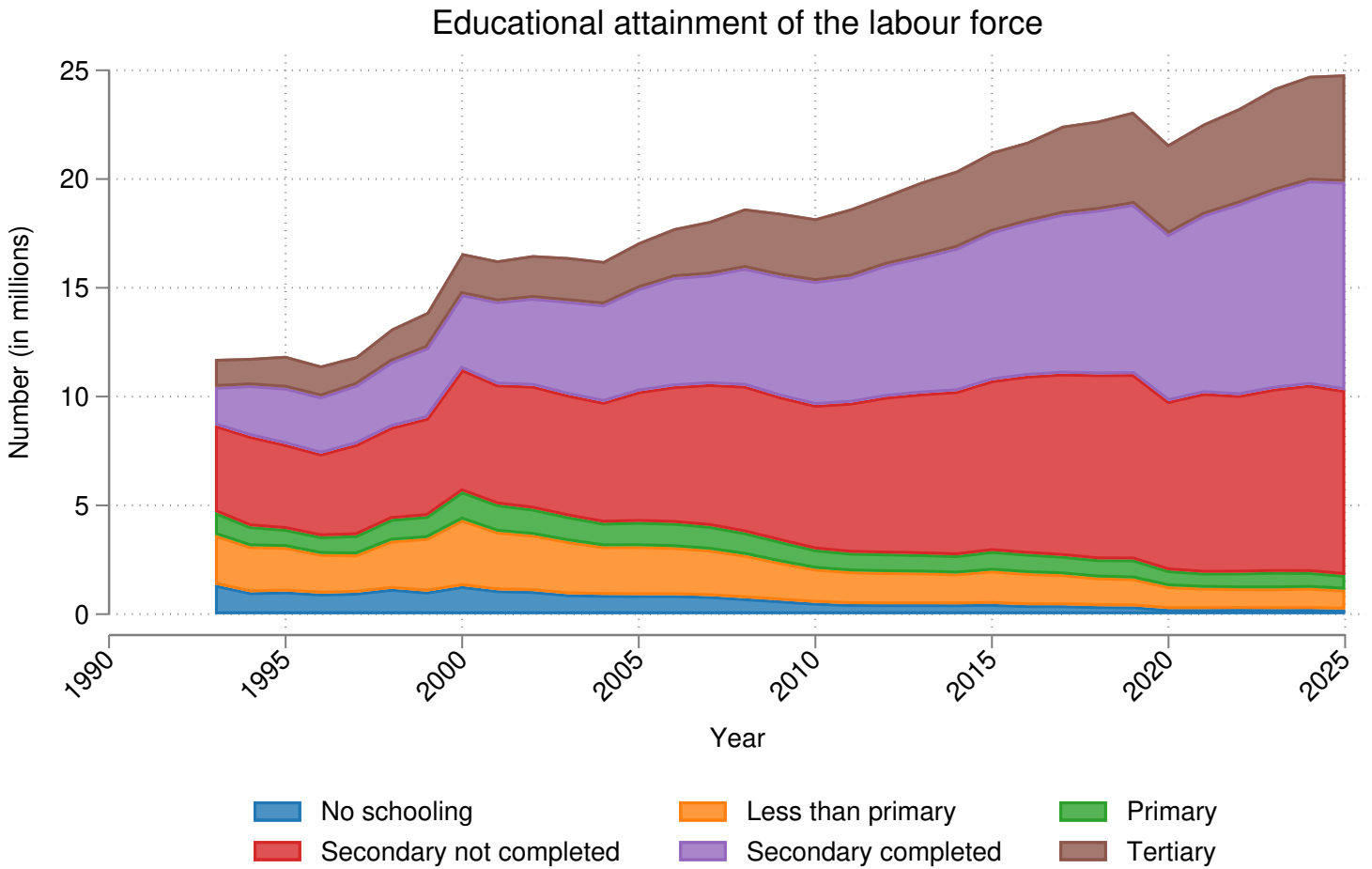
Evidence

- **SF3**: While there has been an increase in educational attainment over time in SA, the highest unemployment rates are experienced for those who have not completed secondary school education.



Human capital

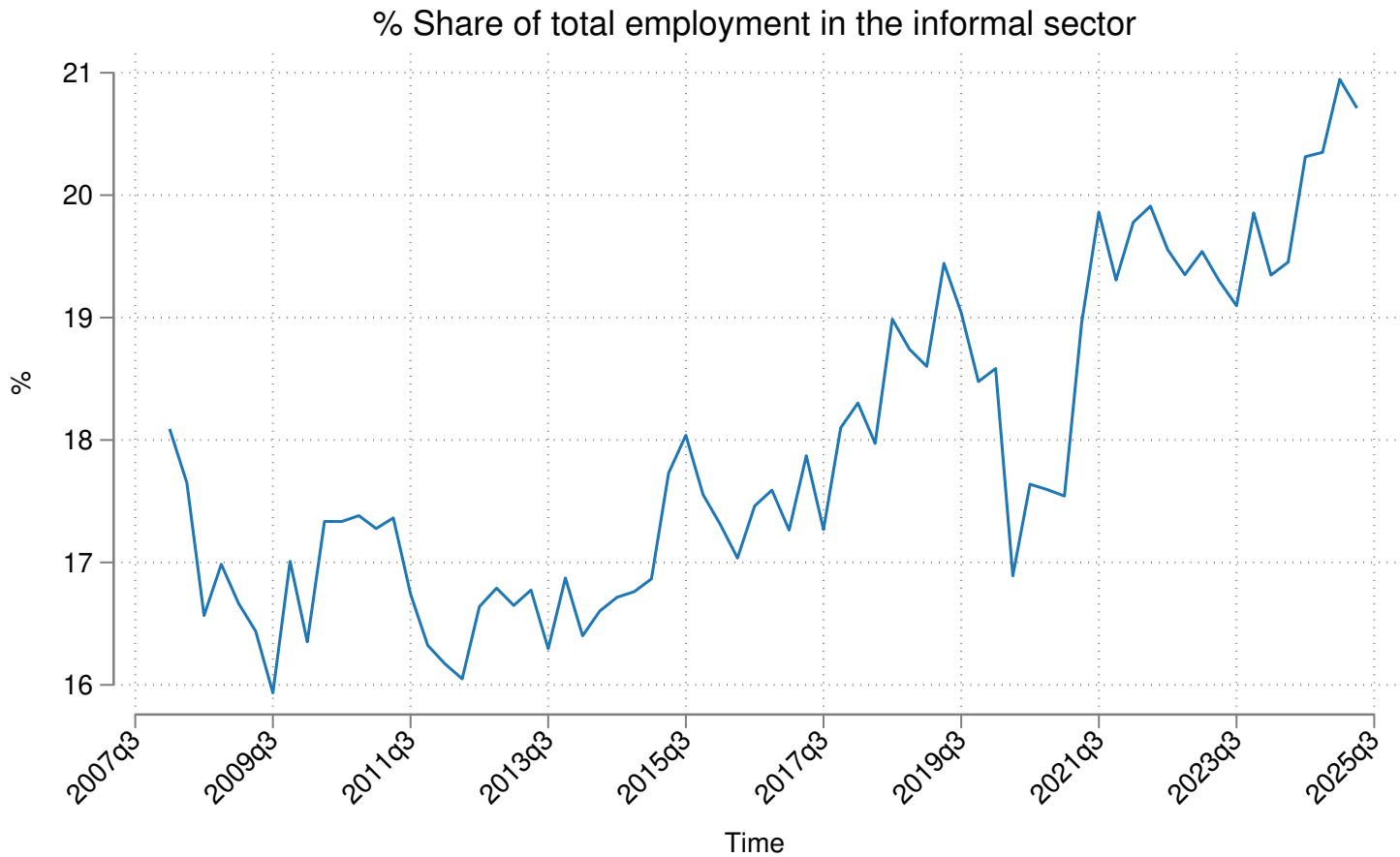
Evidence



Informality

Evidence

- **SF4**: The informal sector in South Africa accounts for approximately 21% of total employment.



Source: Own calculations from PALMS. Data are weighted.

Aggregate worker flows and stocks

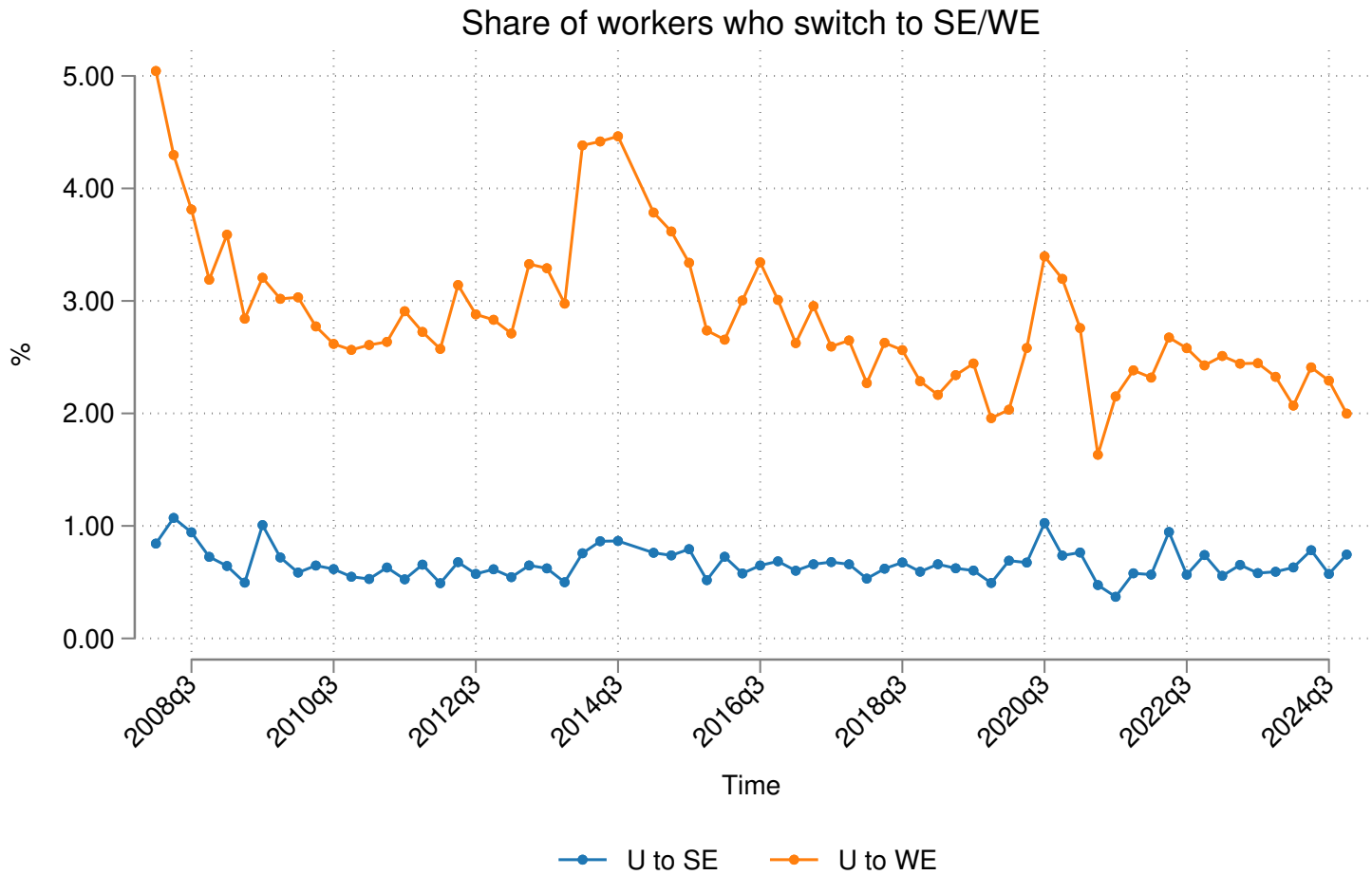
Evidence

Table 1: Average monthly-implied labour market flows and stocks over the full sample period (2008-2024)

Transition matrix from \to			
	se	we	un
se	96.02	2.41	1.57
we	0.41	98.37	1.22
un	0.87	3.75	95.38
Stocks	10.68	61.74	27.58

Aggregate worker flows

Evidence



Aggregate worker flows (cont.)

Evidence

Model overview

Model

- Drawing from Rud and Trapeznikova (2021) and specially Poschke (2024), we build a frictional labour market model combining the tools of the Diamond-Mortensen-Pissarides random search and matching framework with endogenous job destruction, and the two-sector model of development as in Harris and Todaro (1970) or Banerjee and Newman (1993).

- The model allows for labour market frictions as firms and job seekers spend time and resources before the match is created and these inefficiencies matter for job creation, wages and productivity.

- The framework also allows for the unemployed to choose between job search and self-employment, and endogenously generates flows among all three observable labour market states, i.e., *wage employment*, *unemployment* and *self-employment*.

States, flows, search and matching

Model

- Let's denote the measures of the three states, i.e., unemployment (U), wage employment (W), and self-employment (E), by u, n and e, respectively.

- Let $P(AA')$ be the flow rate from state A to state A', with $A, A' \in \{U, W, E\}$, implying a 3 X 3 transition matrix $\mathbf{P}$ between the 3 states.

- Apart from $P(EU)$, which is exogenous, all the other flow rates are endogenous and depend on the labour market tightness and reservation productivity in the wage and self-employment sectors.

- The wage employment sector is populated by heterogeneous firms that differ in productivity, and workers. Once they've entered the market, firms post vacancies at a per-period cost.

States, flows, search and matching (cont.)

Model

- Job seekers enter the frictional labour market where they search for the vacancies posted by firms. Firms and job seekers are paired through a sequential and random matching process.

- The number of matches per period is given by a standard Cobb–Douglas matching function $M(v, u)$:

$$M(u, v) = m\, u^{\mu}\, v^{1-\mu}, \quad 0 < \mu < 1 \tag{1}$$

- If we define market tightness as $\theta = v/u$, then we can express the job finding probability for a job seeker and the vacancy filling rate for a firm, respectively, as functions of θ:

$$r(\theta) = \frac{M(u, v)}{u} = m\,\theta^{\mu} \text{ and } q(\theta) = \frac{M(u, v)}{v} = m\,\theta^{\mu-1} \tag{2}$$

- However, with search by both the unemployed and some self-employed, the labour market tightness becomes $\theta = v/(u + \zeta e)$.

Workers' problems

Model

- The value of employment to a worker who receives a per-period wage w, satisfies the following Bellman equation:

$$W(y) = w(y) + \beta(1-\chi(y))\left[(1-\lambda)W(y) + \lambda E\left(max(W(y'), U)\right)\right] + \beta\chi(y)Q \tag{3}$$

i.e., the sum of income flow from working $w(y)$, the expected capital loss if the job is destroyed following a productivity shock λ and the worker becomes unemployed with value U, and the expected value of entry into self-employment Q. β is the discount factor.

- Since the unemployed choose between job search and self-employment, the value of unemployment is given by

$$U = max(S, Q - k_s)$$

where S is the value of search and k_s is a startup or entry cost into self-employment.

- Finally, the value of search for the unemployed is

$$S = b + \beta\left[\theta q W(y) + (1 - \theta q)U\right] \tag{4}$$

where b is the flow value of unemployment.

Firms' problems

Model

- The value of employment to a firm solves the following Bellman equation:

$$J(y) = y - w(y) + \beta\big(1-\chi(y)\big)\big[(1-\lambda)J(y) + \lambda E\big(max(J(y'),0)\big)\big] \quad (5)$$

As $W(y)$ in equation (3), the match is also subject to productivity shocks, and may be dissolved if it yields a negative value at the new productivity level y' or if workers receive and accept a self-employment opportunity.

- Firms post vacancies at a cost k_v, with the value of a vacancy given by

$$V = -k_v + \beta q J(y_0). \quad (6)$$

- The vacancy is filled with probability q. Free entry (i.e., $V = 0$) then implies the typical free entry condition

$$\frac{k_v}{q} = \beta J(y_0). \quad (7)$$

Wage determination

Model

• Once a match is formed, the firm and the worker bargain over the wage, which is determined by Nash bargaining. The worker's bargaining power is η, implying a sharing rule

$$(1-\eta)\big(W(y)-U\big)=\eta J(y). \tag{8}$$

• Substituting for the expressions of the value functions in (3) and (5) into (8), we get

$$w(y)=\eta y+(1-\eta)\big[(1-\beta)U-\beta\chi(y)k_f\big]. \tag{9}$$

• Finally, substituting (9) into (5) and given the sharing rule and the fact that workers and firms only operate matches that generate non-negative surplus, the worst match to operate would generate $J(R)=0$ (job destruction condition).

Self-employment

Model

- The value of on-going self-employment with productivity z is given by

$$F(z) = z + \beta\{(1-\delta)\left[(1-\zeta\theta q)F(z) + \zeta\theta q \max\left(W(y_0), F(z)\right)\right] + \delta U\}. \tag{10}$$

It implies that self-employment income z will flow until exit or a switch to wage employment occurs; this latter case occurs with probability $\zeta\theta q$, if a new match is preferable to self-employment.

- Finally, self-employment entrants draw their productivity z, so that the expected value of entry into self-employment is

$$Q = E(\max\left(F(z), U\right)). \tag{11}$$

For low productivity draws, it is preferable to return to unemployment. The reservation self-employment productivity is $\bar{z} \equiv \{z | F(z) = U\}$.

Equilibrium

Model

A stationary equilibrium in this economy consists of value functions $W(y)$, $J(y)$, $F(z)$, values U, S, Q, V, a transition matrix $\mathbf{P}$, distributions $n(y)$, $e(z)$, a mass u, thresholds R, $\bar{z}$, z_W, y_Q, policy functions $\chi(y)$, $d(z)$, and numbers θ, k_f and e_{in}, such that individuals and firms behave optimally.

Externally calibrated parameters

Calibration

Table 2: Externally calibrated parameters:

Parameter	Description	Value
β	Discount factor	0.9967
η	Workers' bargaining weight	0.45
μ	Matching function's elasticity	0.40
m	Matching efficiency parameter	1.0
y_0	Productivity of new matches	1.0
π	Fraction of suitable matches	1.0
ϵ	SE entry costs elasticity wrt the entry rate	1.0
b	Flow value of unemployment	0.66
k_z	Tail index of the distribution of z	4.50
ζ	Relative job offer rate for the self-employed	1.20

Internally calibrated parameters

Calibration

Table 3: Internally calibrated parameters:

Parameter	Description	Value
k_v	Firm vacancy posting cost	100.0
λ	Productivity shock arrival rate	0.0125
p_0	Screening rate	1.0
p_1	Learning rate	0.0
$\bar{k}_f$	Scale of entry costs	1000.0
χ	Arrival rate of SE opportunities	0.0041
z_m	Minimum SE productivity	0.635
δ	SE exit rate	0.0157

Baseline findings

Results

Table 4: Model-implied labour market flows and stocks

Transition matrix from \to			
	se	*we*	*un*
se	96.09	2.34	1.57
we	0.41	98.68	0.91
un	0.71	2.01	97.28
Stocks (model)	11.35	61.49	27.15
Stocks (data)	10.68	61.74	27.58

Baseline findings (cont.)

Results

- How do labour market frictions affect core labour market variables?

Table 5: The effects of South Africa's labour market frictions on core variables

Change in	*Effect on*					
	se	*we*	*un*	$\bar{w}$	$\bar{y}$	$\bar{z}$
λ	0.51	-2.40	1.89	-0.53	-0.27	-0.40
k_v	0.60	-1.80	1.20	-0.50	-0.20	-0.76
$\bar{k}_f$	-0.39	-0.02	0.41	0.00	0.00	0.00
λ & k_v	1.14	-4.27	3.13	-1.03	-0.47	-1.16

Next Steps

- Micro-econometric evidence
  - Analyze the relations between search frictions and core labour market variables.
  - Evaluate the effects of labour market frictions on the economy through causal inference.
- Policy experiments
  - Assess the effects on the economy of various labour market policies through the lens of our model.
- Robustness checks
  - Test sensitivity of our findings to various data samples, parametrization, and model assumptions.

Conclusion

- Supply-side disturbances that adversely affect employers, such as more frequent negative productivity shocks or higher vacancy posting costs, lead to a decrease in wage employment as well as wages and related output, with the lower wage employment being offset by higher unemployment and self-employment as one would expect.

- However, self-employment output drops despite the increase, yet marginal, in the number of self-employed, suggesting the existence of some complementarities between the wage employment and self-employment sectors.

- This implies that policies that promote the expansion of formal wage employment may also stimulate self-employment.