

Bringing home the Super: private-sector savings behavior in Papua New Guinea over three decades

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Introduction

What we do

- We examine savings in Papua New Guinea (PNG) over a 20-year period, spanning 3 decades from 1999 through to 2021.
 - Soon to be extended to 1999 to 2021 (PNG Update next week)
- The dataset used includes, to a close approximation, the **population** of formally employed private sector workers in PNG.
- Methods: a combination of OLS (cross-section) and Fixed Effects (panel) regressions

Contribution

- Major contribution to understanding of savings in Papua New Guinea
 - First longitudinal study of savings
- Novel dataset: superannuation database: data from 1980 to 2021
 - Population of private sector formal workers: 250K
- Findings
 - Great deal of heterogeneity in savings behavior in PNG: Across gender, age, and sector/industry
 - Women appear to compensate for their lower receipt of voluntary savings from employers by saving more (voluntarily) themselves

Challenge in developing countries: paucity of data

- Novel use of data set

Papua New Guinea Background

- Papua New Guinea background
 - bottom 25 percent on a wide range of Human Development Index measures (155th in 2019)
 - Population 8.78 million in 2019 (World Bank)
 - 85 percent in rural areas (mainly agricultural), remaining 15 percent in small number of large urban centers
 - Labor force: 2.73 million in 2020 (World Bank); 366,000 in 2020 (ANU) private and public sector; 257,000 formally employed private sector (2019 source?) – matches Nasfund data
 - Growth trend in per capita incomes flat over the past 40 years
 - Prospects for future improvements in economic welfare and health are poor

Savings matters

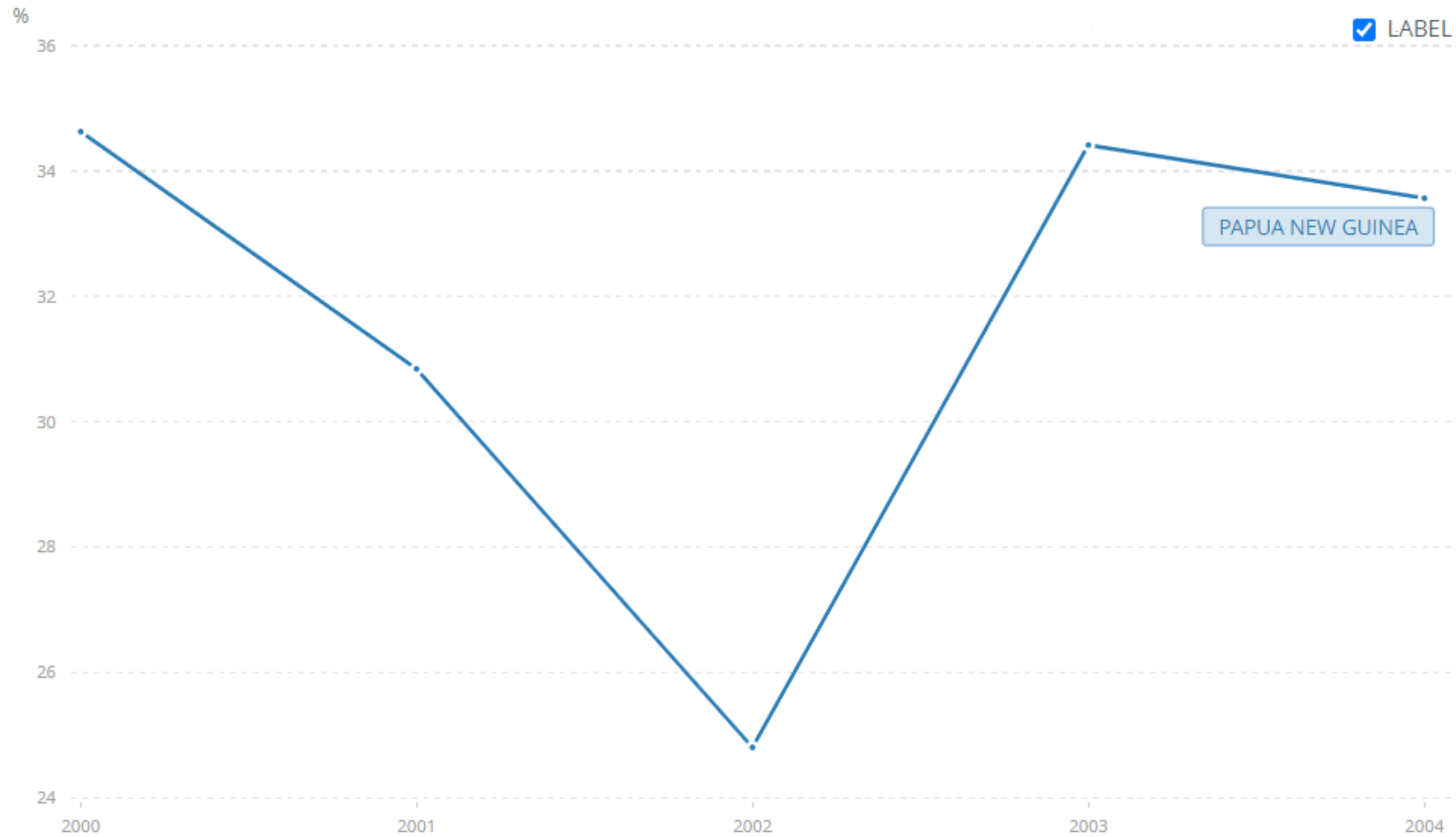
- East Asian Growth ‘Miracle’ (to contrast)
 - per capita incomes have risen from subsistence to developed economy levels in just two generations.
 - massive mobilization of resources
 - labor from subsistence farming to manufacturing
 - high savings rates lead to rapid accumulation of human and physical capital
 - Not a miracle!
- Savings behavior matters!
 - Accumulation of capital (physical and human) is a key driver of economic growth (Solow 1956, etc.)
 - Aggregate savings behavior of population of key importance to economic growth and development.
 - Study of individual level savings behavior underpins this aggregate savings

Why should we care....?

- (1) Aggregate savings is an important determinant of growth
 - (2) Policy makers are therefore well served to know how individual savings change over time and how they respond to macroeconomic episodes of boom & bust
 - (3) This includes also being cognizant of possible asymmetric responses – including across sector and/or gender, for example
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- **Research questions:**
 - (1) What has conditional (on individual & firm fixed effects, etc.) individual savings in PNG been during the time under study – across the full period, as well as during prior identified periods of macroeconomic boom & bust?
 - (2) Are there **sectoral** asymmetries in conditional individual savings in PNG – again considering the full period, as well as the prior identified periods of macroeconomic boom & bust?
 - more to come on this later
 - (3) Are there **gender** asymmetries in conditional individual savings in PNG – again considering the full period, as well as the prior identified periods of macroeconomic boom & bust?

Paucity of data: this is it!

World Bank Savings Data, 2000-2004



Data

- Papua New Guinea is under-researched
 - paucity of economic data (also a lack of research effort)
- Nasfund superannuation database: largest private-sector superannuation fund in PNG
- Use four SQL tables
 - General ledger (history of all transactions)
 - Member (individual member employment history: continuing (active) or exiting (inactive))
 - Client (individual member characteristics: age, sex, marital status, number of dependents) → Notably, education is missing but individual fixed effects go at least some (a good deal of the! 😊) way towards remedying that
 - Payroll (firm details and location) → Firm id allows for using firm fixed effects
- 670,000 unique individuals (some retired, some multiple accounts)
- Merge with the available worker and firm information from all SQL tables
 - panel dataset of annual savings and individual and firm characteristics.

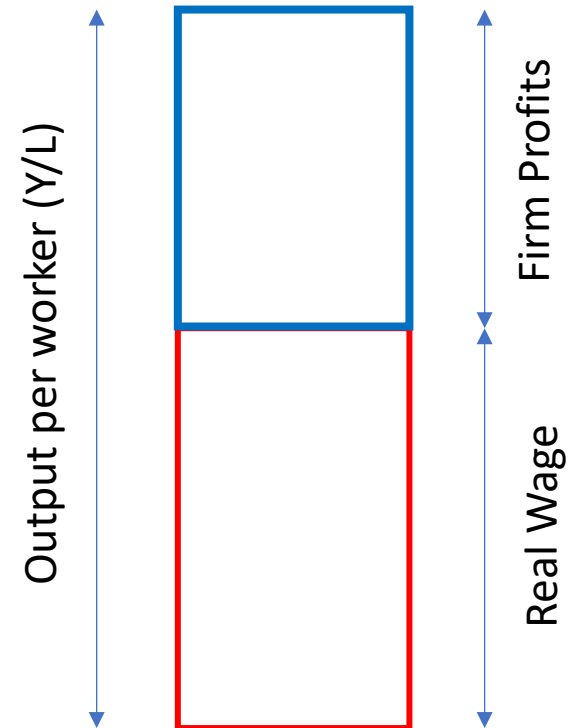
What is real savings?

- Nominal savings (S): kina per pay period
- Price level (P): cost in kina of the basket of goods in that household consumes

- Real saving: $\frac{S}{P}$ (number of baskets of goods per pay period)

e.g. $S=100$, $P=2$, *Real savings = $S/P = 50$ baskets*

- Determinants of S/P
 - worker income
 - age, gender
 - skills, education, experience and ability
 - firm productivity, firm mark-up
 - wage bargain between workers and firms
 - Macro influences
 - price level, real exchange rate, minimum wage, taxes



Economic Conditions: 1999-2018

- Three sub-periods: bust-boom-bust :
- **1999-2002 (bust):**
 - Low commodities prices
 - Prefaced by severe drought over 1995-1997
 - Low growth due to preceding years of poor governance and corruption, and low commodities prices
- **2003-2013 (boom):**
 - large and sustained improvement in the commodity terms of trade leading to robust growth
 - punctuated by the global financial crisis in 2009 (large and offsetting fiscal stimulus)
 - concluded with an investment boom during 2010-2013 (construction of LNG gas project infrastructure)
- **2014-2018 (bust):**
 - Mid-2014: end of commodities super-cycle and investment boom
 - Low commodity prices and foreign exchange rationing by Bank of PNG (central bank)
 - Mixed periods of recession and sluggish growth in non-resource sector
 - Mining sector boom, but few, if any, spillovers to rest of economy (enclave effect)

Results I: Pooled OLS

	Total	EmployeeE	EmployeeR
female	0.065*** [0.005]	0.198*** [0.027]	-0.104** [0.046]
age_25_34	0.424*** [0.015]	0.557*** [0.190]	1.390** [0.597]
age_35_44	0.794*** [0.016]	0.584*** [0.189]	1.686*** [0.597]
age_45_54	1.049*** [0.016]	0.854*** [0.190]	1.762*** [0.597]
age_55_64	0.772*** [0.017]	0.949*** [0.191]	1.727*** [0.599]
Sector_Mining	1.726*** [0.011]	1.213*** [0.055]	0.424*** [0.064]
Sector_Industry	0.445*** [0.008]	-0.054 [0.045]	-1.485*** [0.084]
Sector_Services	0.718*** [0.007]	0.311*** [0.039]	-0.499*** [0.067]
Sector_Other_or_NA	0.784*** [0.008]	0.354*** [0.049]	-0.967*** [0.097]
year	0.042*** [0.000]	0.014*** [0.002]	0.102*** [0.007]
Constant	-79.422*** [0.604]	-23.122*** [3.342]	-201.577*** [13.224]
R-squared	0.139	0.038	0.183
N	1,451,549	48,084	14,344

→ Substantially large gender savings gap

→ Increase, then dip, over age

→ Sectoral savings gap

→ Substantial trend + asymmetry btw employeE & employeR VOL savings

Results II: Fixed effects, w/ time trend → Full sample + Stratified I

(i) Full sample:							
	Total savings	EmployeeE	EmployerR				
year	0.040***	-0.002	0.117***				
	[0.000]	[0.002]	[0.003]				
N	1,330,269	39,192	12,494				
(i) By gender:				(ii) By sector:			
	Women:	Men:	Agriculture:	Mining:	Industry:	Services:	Other sector/Not assigned/Missing:
(i) TOTAL savings:							
year	0.040***	0.040***	0.025***	0.052***	0.043***	0.038***	0.035***
	[0.000]	[0.000]	[0.001]	[0.001]	[0.000]	[0.000]	[0.001]
N	394,365	932,747	116,036	86,656	248,828	747,553	104,883
(ii) EmployeeE Voluntary:							
year	-0.002	-0.002	0.013**	0.144***	0.006	-0.013***	-0.001
	[0.003]	[0.002]	[0.006]	[0.012]	[0.004]	[0.002]	[0.009]
N	11,635	27,465	2,964	4,109	9,116	20,826	1,798
(iii) EmployerR Voluntary:							
year	0.092***	0.123***	0.185***	0.132***	0.089***	0.102***	0.061
	[0.009]	[0.003]	[0.012]	[0.004]	[0.017]	[0.005]	[0.087]
N	2,608	9,880	890	3,798	568	6,990	202

→ Substantial overall savings trend

→ Asymmetry in overall savings trend

→ Gender gap in savings trend between employeeE & employerR voluntary savings

→ Sectoral gap in savings trend between employeeE & employerR voluntary savings

Results III: FE w/ time trend → Stratified II

	Agriculture:		Mining:		Industry:		Services:		Other sector/Not assigned/Missing:	
	Women:	Men:	Women:	Men:	Women:	Men:	Women:	Men:	Women:	Men:
(i) TOTAL savings:										
year	0.027***	0.025***	0.054***	0.051***	0.046***	0.042***	0.036***	0.038***	0.040***	0.033***
	[0.002]	[0.001]	[0.002]	[0.001]	[0.001]	[0.001]	[0.000]	[0.000]	[0.001]	[0.001]
N	22,370	93,655	11,793	74,854	58,011	190,761	267,922	479,318	28,453	75,326
(ii) Employee Voluntary:										
year	-0.035	0.016***	0.196***	0.138***	0.019**	0.002	-0.007**	-0.018***	0.001	-0.001
	[0.025]	[0.006]	[0.040]	[0.012]	[0.008]	[0.005]	[0.003]	[0.003]	[0.017]	[0.011]
N	389	2,572	549	3,560	1,882	7,226	8,054	12,745	673	1,121
(iii) Employer Voluntary:										
year	0.195***	0.182***	0.123***	0.133***	-0.283*	0.098***	0.076***	0.111***	0.125	0.013
	[0.028]	[0.014]	[0.011]	[0.004]	[0.157]	[0.016]	[0.011]	[0.005]	[0.163]	[0.081]
N	185	705	450	3,348	21	547	1,835	5,153	101	101

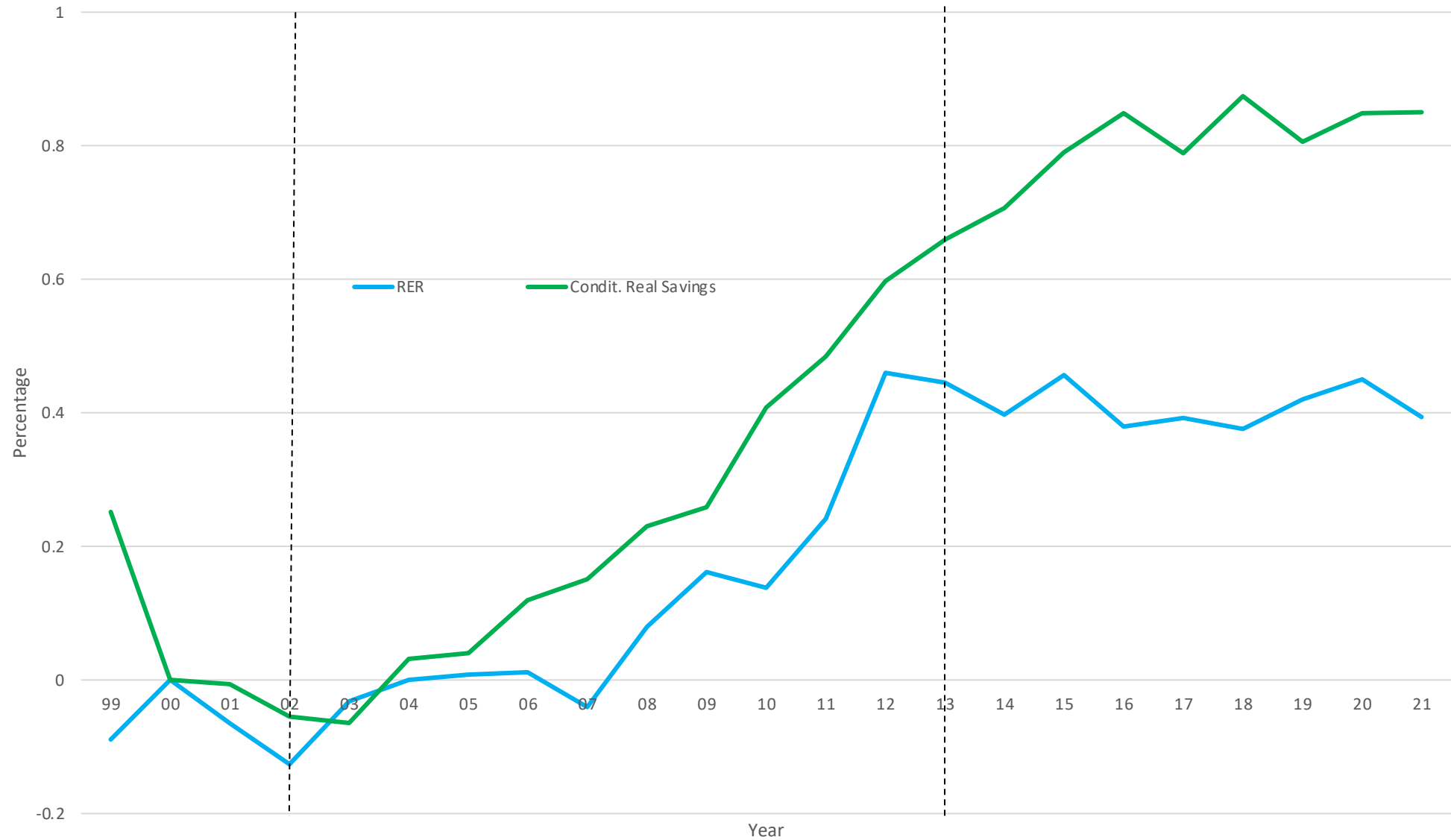
→ Gender gap in savings trend **within** sectors for most if not all types of saving – and sometimes dramatically so

Results IV: Fixed effects, w/ time trend → Vehicle for cumulative conditional savings growth graph

D2000	-0.290***
	[0.005]
D2001	-0.298***
	[0.006]
D2002	-0.366***
	[0.006]
D2003	-0.380***
	[0.006]
D2004	-0.249***
	[0.006]
D2005	-0.238***
	[0.006]
D2006	-0.142***
	[0.006]
D2007	-0.106***
	[0.006]
D2008	-0.022***
	[0.006]
D2009	0.007
	[0.006]
D2010	0.145***
	[0.006]
D2011	0.209***
	[0.006]
D2012	0.297***
	[0.006]
D2013	0.342***
	[0.006]
D2014	0.375***
	[0.006]
D2015	0.431***
	[0.006]
D2016	0.468***
	[0.006]
D2017	0.430***
	[0.006]
D2018	0.484***
	[0.006]
D2019	0.441***
	[0.006]
D2020	0.468***
	[0.006]
D2021	0.469***
	[0.006]
age_25_34	-0.533**
	[0.235]
age_35_44	-0.478**
	[0.224]
age_45_54	-0.473**
	[0.225]
age_55_64	-0.491**
	[0.217]
Constant	7.191***
	[0.218]
R-squared	0.752
N	1,330,269

→ Substantial deviations in the conditional average savings from year to year

Cumulative change in conditional real savings, 1999-2021



Results V: “Explaining” the time dummies

Real GDP per capita	0.000*** [0.000]
Real exchange rate	0.005** [0.002]
CPI	-0.009 [0.005]
Inflation	0.014 [0.013]
Real interest rate	0.022 [0.017]
Constant	-0.772** [0.351]
N	19
R ²	0.980

Conclusion & Policy Implications

- Need more & better policies to encourage and safeguard retirement savings in PNG.
- Specifically, savings behavior in PNG differs widely across:
 - Gender
 - Notably here women seem to make up for their disadvantage in employer voluntary savings contributions (relative to men) by saving more themselves
 - Age
 - Sector/Industry (results to come)
- Since savings acts both as a macroeconomic stabilizer, as well as directly affects the welfare of people in PNG, the savings behavior in PNG would seem to warrant more attention from policy makers in the future

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