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Relationship between Major Budgetary Component of Government Expenditure & Economic Growth in the Free State Province: An Empirical Analysis.

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Introduction

- Popular view – Government expenditure (GE) plays an important role in boosting economic (GDP) growth…positive correlation exist.
- But, extant studies have also found a negative and neutral relationships between GE and GDP using aggregate data (2quote).
- Theoretical notions underpinning the GDP-GE nexus, at aggregate level is predominated by 2 opposing theories, viz:
    - Wagner's Law (Wagner,1813)
    - Keynesian theory – multiplier principle (Keynes, 1936)
- WL assumed that GDP is an outcome of increasing GE. Thus, GE is a passive fiscal tool with no stimulatory effect on GDP
- Keynesian theory, assumed that GE plays an active role in generating GDP growth serving as an important fiscal tool

Existence of Theoretical Discordance…

- Problems with Keynesian theory…High GE (i) crowds-out private sector employment and productivity, (ii) become counter-productive as marginal value (or returns) diminishes, (iii) cause inefficient allocation of resources, e.g. large government size increases wage bill, and (iv) create distortionary effect, e.g., rent seeking behaviour, moral hazards etc
- Common ground between Keynes and Wagner's theories? Both asserts a long-run relation between GE & GDP at aggregate level.
- But, endogenous growth theory (EGT) argued that, to get a clear picture of the GE-GDP nexus, empirical studies should focus on components of GE and their relationship on LT growth.
- EGT assumed that, at disaggregated level:
  - Major components of GE (those with sizeable share) have differentiated effect on long-term GDP growth
  - Large GE is typically assumed to be productive (i.e. positively influence GDP) but can "actually be" non-productive.

Can an effective Fiscal Policy attainable using Government Expenditure?

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- For policy makers to use GE as an effective fiscal policy tool with efficient distributional effect, it is imperative to:
    1. Understand the nature of (long-run) relationship between components of GE and GDP overtime
    2. Establish the type of causative links (intertemporal dynamics) between GE sub-components and GDP – i.e. short run relations, which can be unidirectional, bi-directional (feedback effect) or neutral.
    3. Know which sub-components of GE are main determinant of GDP growth to prevent knee-jerk reaction linked to budget cut – typical coping mechanisms during fiscal stress periods.
- To shed light on these pre-conditions remains an empirical issues NOT based on apriori judgement / gut feeling.
- Against this backdrop, this paper empirically examine the long-run relationship and causative links between sub-components (with historically large budgetary allocation) of provincial GE and economic growth in FS.

Existing Studies & Contribution

- Empirical literature on SA's GDP-GDE nexus is scarce. Only few studies exists, see., e.g., Ziramba (2008), Menyah & Wolde-Rufael (2012) ; Alm & Embaye (2010) and Odhiambo et al. (2015). Only Chang et al. (2004) and Akitoby et al. (2006) include SA in their cross-sectional studies.
- Evidence from earlier studies are mostly inconclusive.
- Previous studies by, e.g. Omoshoro-Jones (2016) only considered GDP-GE nexus at aggregate level in a multivariate model applying ARDL and TY causality rests, and finds a bi-directional (two-way) relationship btw total GE and GDP per capita & a long-run income elasticity between 0,9 to 1.2 % for FS.
- Also, Omoshoro-Jones (2015) focused on the impact of rising GE on public employment programme (i.e. EPWP) on GDP growth and labour dynamics in FS employing Johansen-Juselius cointegration & Engle-Granger causality tests. Result shows that GE on EPWP has no effect on GDP growth in FS, but a weak positive effect on unemployment rate exists.
- To our knowledge, this is the first study to explicitly analyse the relationship between (major) sub-components of GE and GDP using disaggregated data at both national (SA) and provincial levels.

Policy-relevant Questions & Methodology

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- **What do we ask?**
  - Can the allocation to sizeable budgetary components (Health, Education and Current expenditures) be justified as productive public spending or not?
  - Does these major sub-components of GE positively affects GDP growth or not?
  - If not? How can the constraints between GDP-GE be remedied for GE support GDP growth in FS?
- **Econometric Techniques.**
  - Built a multi-variate model, to obviate misspecification and "omitted variable" bias.
  - Applied Hodrick-Prescott (HP) filter to decompose GDP series into its cyclical and trend components.
  - Employed superior econometric techniques:
    - **ARDL-Bound Cointegration test approach** (Pesaran et al. 2001) to uncover long-run relationship
    - **Toda-Yamamoto non-Granger causality test** (Toda and Yamamoto, 2005) to determine short-run relations.
  - Where applicable, use ARIMA X13 to seasonalised time series.
  - Carry-out relevant pre & post diagnostic tests.

Stylised Facts on GE–GDP Nexus in FS: What does it look like?

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- Examining the GDP-GE Nexus: The Case of the Free State.
  - Anecdotal evidence of rising GE without any noticeable effect on economic activity level (GDP growth)
  - In contrast, total Share of FS contribution to national GDP is on a steady descent – fell to 5,1% (in 2016) from 5,4% (in 2007).
  - FS GDP peaked at 4.9% (in 2000), but gradually fell to 0,3% (in 2016) with slight improvement to 1,3%.
- What does disaggregated data on budgetary component say?
  - Total fiscal allocation grew to R35bn in 2017/18 FY from R13bn in 2007/08 FY.
  - 65% of Provincial budget is absorbed 3 budgetary allocations, especially Health and Education sectors!
  - 85% of fiscal allocation at sectoral level is expended on Current expenditure (includes CoE)!

Stylised Fact (1)
Trend of FS Provincial GE, 1999-2017

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MTEF	Budgetary Allocations (% share) (per provincial departments)[a]			Expenditure on Social Services [b] (% share of Total)				Other Expenditure (% share of Total) [b]		
Year	Edu	Health	Soc.Dev	Edu	Health	Soc.Dev	Other function	Capital assets	Current	Transfers and Subsides
1999/00	-	+	-	50	29	21	0	4	78	18
2000/01	40	24	-	50	29	21	0	6	76	18
2001/02	39	24	18	39	23	18	20	5	72	23
2002/03	36	23	22	37	22	22	19	4	68	27
2003/04	35	22	25	46	28	3	23	6	82	12
2004/05	34	22	27	45	29	3	23	4	85	10
2005/06	35	22	28	46	29	4	21	5	85	10
2006/07	43	28	4	43	28	4	25	9	79	12
2007/08	44	29	3	44	29	3	24	10	79	11
2008/09	42	28	3	42	28	3	27	12	75	13
2009/10	42	28	4	40	28	4	28	9	77	13
2010/11	40	29	3	40	29	3	28	6	77	16
2011/12	41	29	3	41	29	3	27	8	77	15
2012/13	41	30	3	41	30	3	26	10	77	14
2013/14	40	28	4	40	28	4	28	9	76	16
2014/15	41	29	3	40	29	3	27	6	81	13
2015/16	38	30	3	40	29	3	27	7	80	13
2016/17	38	29	4	39	29	4	28	3	85	12
2017/18	39	28	3	-	-	-	-	-	-	-

Sources: [a] Free State Provincial Treasury, In-Year-Monitoring (IYM) database
[b] National Treasury, Provincial Budget Expenditure Review

Note: 1. FS = Free State Province; Edu = Education; Soc.Dev = Social Development

Stylised Fact (2)
PGE on key budget sub-components, 1999-2017

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Fig.1: PGE on Social Services, real series (1999-2016)

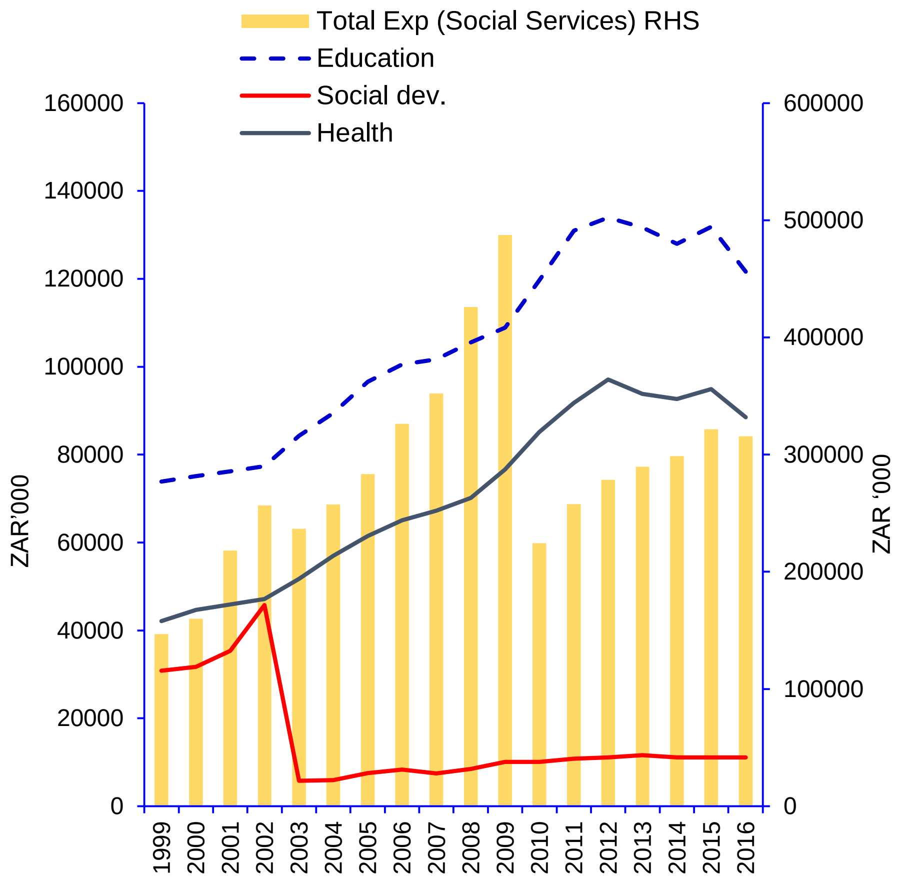
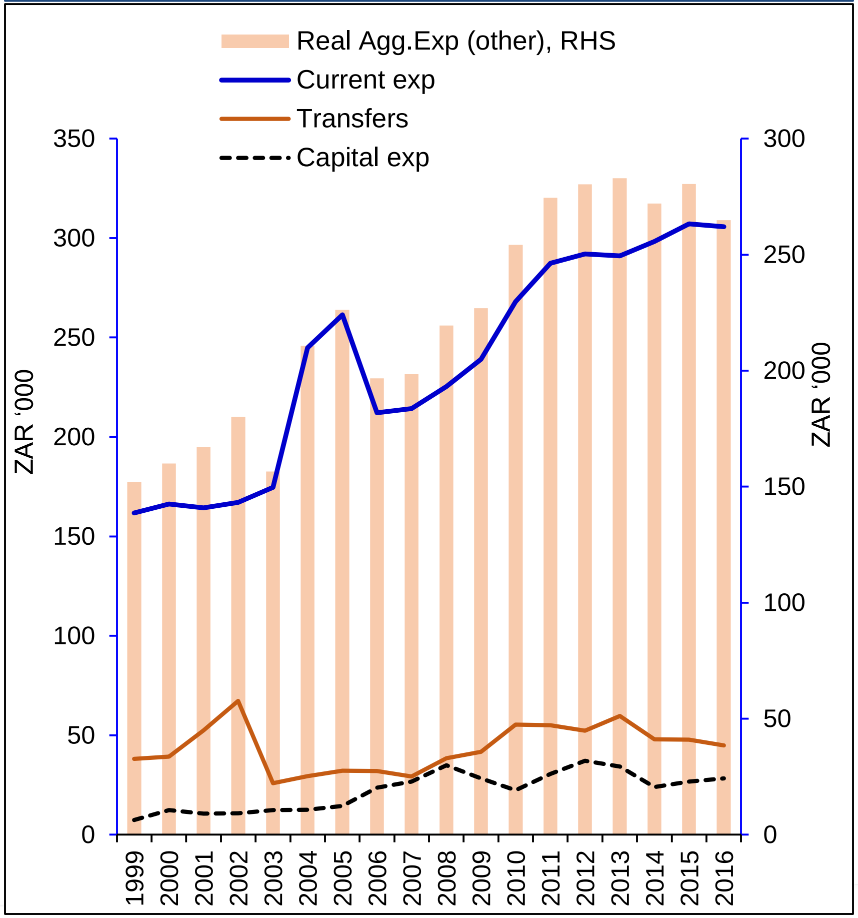


Fig.2: PGE on capital, current and Transfers & subsidies, real series (1999 – 2016)



Stylised Fact (3)
GDP Trend: FS vs. SA, 1999-2017

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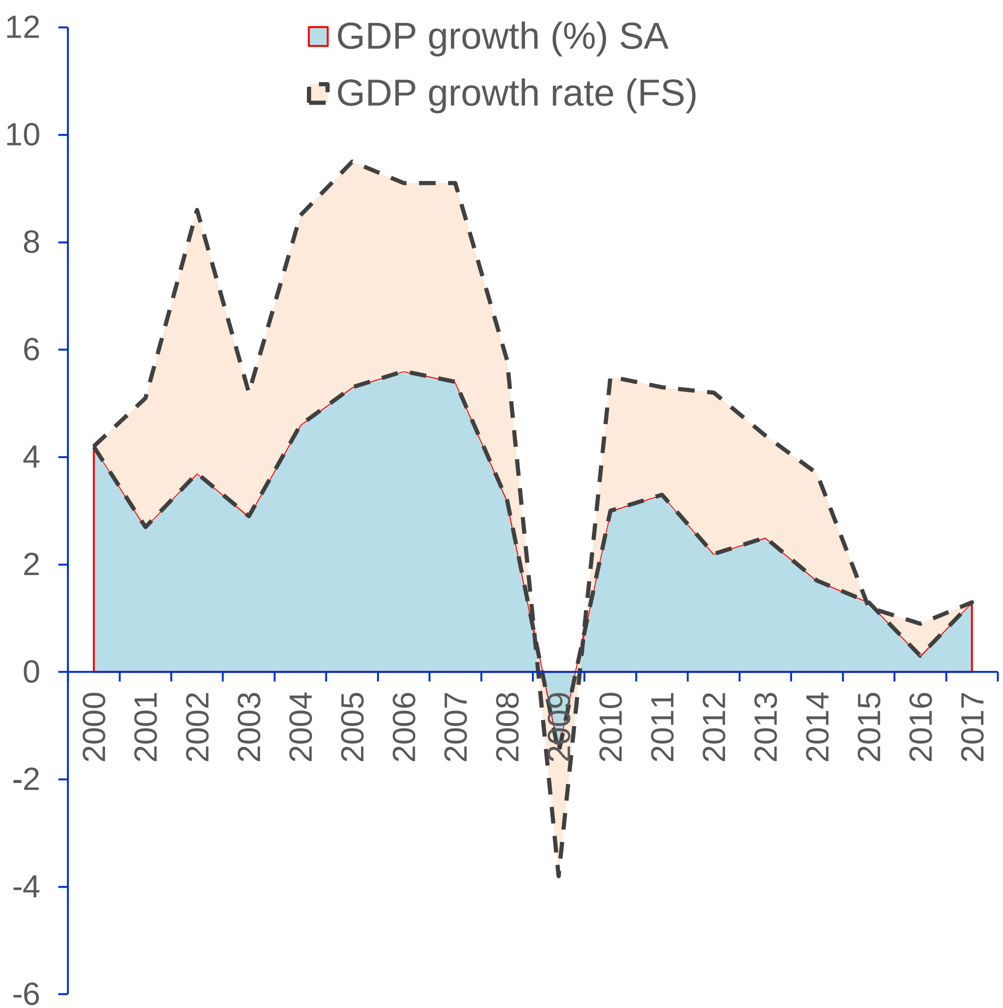

- FS government's intensive effort to drive economic development mainly via education and health expenditures, but social development (esp. PEP) is poorly funded.
- **Large GE on education, health and current expenditures**…possible crowd out & becoming unproductive expenditures?
- **Low GE on capital** – at odds with economic theory - high capital investment directly raise GDP growth (directly), TFP (indirectly) and has a reducing effect on poverty & unemployment rate (32.6%)…reason why poverty and unemployment rate is persistently high in FS, and low growth?

❑ FS GDP growth is mostly likely to remain pervasively weak due to fiscal misallocation on capital, transfers and subsidies needed to spur vibrant economic activity level and create sustainable growth.

Theoretical Literature:
Wagner's Law (1)

1. **Wagner Law** (Wagner, 1813) – Law of expanding state in Public Finance.

- GE grow faster than GDP growth due to rise in income per capita attributed to economic prosperity, thus the increasing public spending is a by-product of economic development. The rapid increase in GE can be ascribed to:
  - Administrative and protective functions of state substituted for private activity,
  - Provision of social and cultural goods (inelastic public goods),
  - Public intervention to manage and finance natural monopolies, and ensure smooth functioning of market forces (Bird, 1971)
- As per capita income rises, demand for public services increases due to urbanisation and industrialisation $\Rightarrow$ Income elasticity exceeds unity in the long-run.

❑ **On GDP-GE nexus:**

- Long-run relationship between GDP and GE relationship with Long-run income elasticity exceeds unity (see.g., Ram 1992; Herenkson,1993).
- **A unidirectional causality from GDP to GDE in the short run** (see, e.g, Ashan et al. 1992,1996; Ansari et.al. 1997; Islam, 2001; Iyare et al. 2006)
- By implication, **increasing GE plays a passive role in stimulating GDP**

Theoretical Literature:
Keynesian theory (2)

2. Keynesian Multiplier Principle (Keynes,1936) - classical economists

- Government plays an important role in economy.
- GE is required to mitigate the impact of idiosyncratic shocks, e.g. natural disaster & war (Rodrik, 1998)
- GE is a useful stabilising policy instrument to boost GDP in the short-run and higher growth in the long-run via multiplier effect on aggregate demand.
- ↑ GE = ↑ firm production = ↑ Labour demand (jobs creation) = ↑ HDI = ↑ AD
- High GE stimulate firm's profitability, investment and employment rate via multiplier effect on aggregate demand.

❑ **On GDP-GE nexus:**

- Long-run relationship between GDP and GE relationship
- **A unidirectional causality from GE to GDP in the short run** (see, e.g., Rao, 1989; Holmes et al.1990), indicating that high GE is an outcome of GDP growth
- High GE is a main driver of aggregated demand and output growth, in the short-run

- **When GE is too high?** Over heating economy, crowding out of private sector productivity and employment, distort market operations, inefficient fiscal resource allocation & diminishing returns on GE

Theoretical Literature:
Endogenous Growth theory (3)

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3. Endogenous Growth theory

- Exact GE–GDP nexus is dependent on the relationship between different components of GE on long-run GDP (see, e.g. Barro, 1990; Barro and Sala-Martin, 1992; Barro and Sala-i-Martin, 1995; Easterly and Rebelo, 1993).
- Different components of GE can positively influence long-run GDP growth (productive) or not (unproductive), and even negative effect (Barro, 1990; Barro and Sala-Martin, 1995).
- Human capital and capital stock accumulation drives GDP growth as TFP increases, with an educated workforce harnessing technological spillover to generate innovative products, businesses and entrepreneurial opportunities, which indirectly stimulate TFP and GDP growth (Romer, 1990).
- Faster growth in GE can be attributed to an increasing demand for inelastic public goods, in particular social services goods, e.g. education, health and welfare (Dritsakis and Adamopoulous, 2004)
- Higher population growth can negatively affect GDP growth – requires higher fraction of savings to keep capital-labour ratio constant (Solow and Swan, 1956).

❑ Mostly, social expenditures (health, education & welfare) and capital expenditures are expected to have positive effect on long-run GDP (productive), while defense and current expenditures could dampen long-run growth, but in some cases, a negative or insignificant effect on GDP growth may be deduced (see, e.g., Landau, 1983; Sighn and Sahni, 1984; Aschaeur, 1986; Ram, 1986; Barro, 1989, 1991; Deverajan et al.1993; Narayan and Symth, 2004; Narayan, 2006; Bose et al. 2007; Bojanic, 2013; Khan et al. 2015)

Y

Model Specification: The ARDL Model

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Guided by conventional economic theory, we assume that:

$$Y_t = f(GEH_t, GEEDU_t, GESOC_t, \mathrm{P}_t) \qquad \text{Eq.1}$$

$$Y_t = f(CAPEX_t, CUREX_t, TSFEX_t, \mathrm{P}_t) \qquad \text{Eq.2}$$

- ARDL model (for models testing Wagner's Law):

$$\Delta \ln Y_t = \alpha_0 + \sum_{i=1}^{l} \alpha_1 \Delta Y_{t-i} + \sum_{i=2}^{l} \alpha_{2i} \Delta \ln X_{t-i} + \sum_{i=3}^{l} \alpha_{3i} \Delta \ln(N / Y_{t-i}) + \beta_1 \ln Y_{t-1} + \beta_2 \ln X_{t-2}$$
$$+ \beta_3 \ln(N / Y_{t-3}) + \mu_1 D1 + \mu_2 D2 + \mu_3 trend + \delta_1 ECT_{t-1} + \varepsilon_{1t} \qquad \text{Eq.3}$$

- ARDL model (for models testing Keynesian theory):

$$\Delta \ln X_t = \lambda_0 + \sum_{i=1}^{l} \lambda_1 \Delta X_{t-i} + \sum_{i=2}^{l} \lambda_{2i} \Delta \ln Y_{t-i} + \sum_{i=3}^{l} \lambda_{3i} \Delta \ln(N / Y_{t-i}) + \pi_1 \ln X_{t-1} + \pi_2 \ln Y_{t-2}$$
$$+ \pi_3 \ln(N / Y_{t-3}) + \mu_1 D1 + \mu_2 D2 + \mu_3 trend + \delta_2 ECT_{t-1} + \varepsilon_{2t} \qquad \text{Eq.4}$$

where, Y_t = real GDP per capita ; X_t = interchangeably real PGE on EDU, HEA, SOCDEV, CAP,CUR and TRSF; (N / Y_t) = Population growth (per capita)

Model Specification: Toda-Yamamoto non-Granger Causality (MWALD) Technique.

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- β_s and π_s are long run coefficients; $\alpha_1, \alpha_2, \alpha_3$ and π_1, π_2, π_3 are short-run dynamics; ε_{1t} & ε_{2t} are error terms; ECT_{t-1} is the lagged error correction term; δ_s is the speed of adjustment; Δ is the lag operator; $D1$ & $D2$ are dummy variables capturing structural breaks associated with the 2001-02 and 2007-09 global crisis respectively.

- Toda-Yamamoto Granger causality test (for all models testing Wagner's Law):

$$\ln Y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \ln Y_{t-1} + \sum_{j=k+1}^{d\max} \alpha_{2j} \ln Y_{t-j} + \sum_{i=1}^{k} \varphi_{1i} \ln X_{t-1} + \sum_{j=k+1}^{d\max} \varphi_{2j} \ln X_{t-j} + \sum_{i=1}^{k} \theta_{1i} \ln(N / Y_{t-1}) + \sum_{j=k+1}^{d\max} \theta_{2j} \ln(N / Y_{t-j}) + \varepsilon_{1t} \qquad \text{Eq.5}$$

- Toda-Yamamoto Granger causality test (for all models testing Keynesian's theory

$$\ln X_t = \lambda_0 + \sum_{i=1}^{k} \lambda_{1i} \ln X_{t-1} + \sum_{j=k+1}^{d\max} \lambda_{2j} \ln X_{t-j} + \sum_{i=1}^{k} \varpi_{1i} \ln Y_{t-1} + \sum_{j=k+1}^{d\max} \varpi_{2j} \ln Y_{t-j} + \sum_{i=1}^{k} \eta_{1i} \ln(N / Y_{t-1}) + \sum_{j=k+1}^{d\max} \eta_{2j} \ln(N / Y_{t-j}) + \varepsilon_{2t} \qquad \text{Eq.6}$$

Empirical Results

- Post-estimation diagnostic tests
- Discussion of Results

Structural breaks in data: Decomposition of real GDP series

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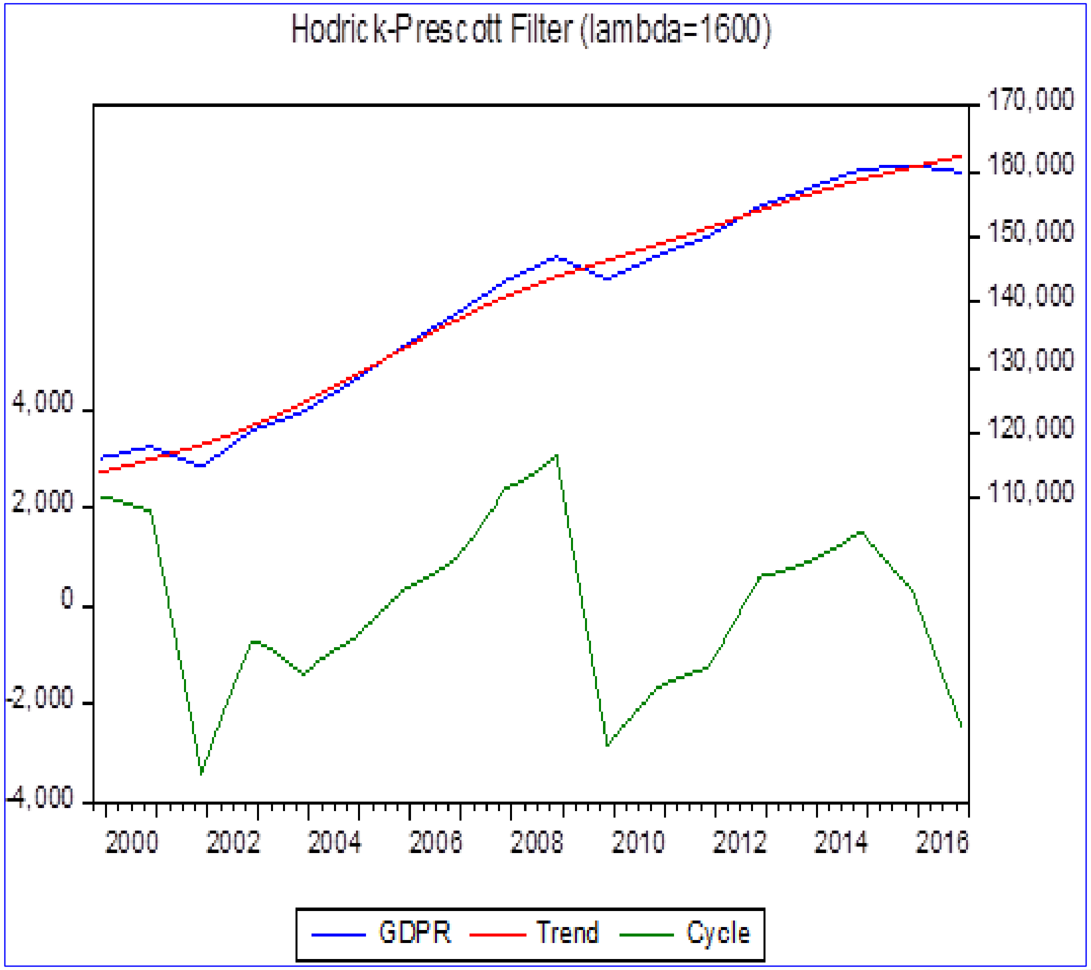

- In the international real business cycle (IRBC) literature, HP is widely employed to extract business cycles in GDP series.
- Need to account for structural breaks in data to obviate spurious regression
- Breaks in data coincides with major global crisis, 2001 financial contagion and 2007/08 global economic recession.
- The inclusion of dummy variables in the specified ARDL models is required.

Stationarity Properties
Zivot-Andrews (1992) Unit root test result

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Variable	Intercept		Trend		Both	
	TB	t-statistic	TB	t-statistic	TB	t-statistic
$Ln(y/N)$	2004Q4	-3.220	**2007Q4**	-3.972	**2008Q4**	-4.109
$\Delta Ln(y/N)$	**2001Q4**	-5.159**	**2002Q2**	-8.230*	**2001Q4**	-5.572**
$LnEDU$	2015Q4	-2.364	2013Q1	-3.521	2013Q3	-3.357
$\Delta LnEDU$	2012Q4	-4.477**	2015Q2	-8.249*	2012Q4	-5.224**
$LnHEA$	2015Q2	-2.198	2012Q3	-3.547	2013Q1	-2.857
$\Delta LnHEA$	2013Q1	-9.558*	**2002Q2**	-8.454*	2013Q1	-9.526*
$LnSOC$	2003Q2	-8.602*	2005Q2	-4.844**	2003Q2	-8.455*
$\Delta LnSOC$	2004Q4	-14.256*	2003Q2	-4.670**	2004Q4	-15.413*
$LnCAP$	2015Q4	-2.355	2014Q1	-2.957	2013Q1	-2.941
$\Delta LnCAP$	2015Q4	-8.914*	2015Q2	-8.400*	2015Q4	-9.084*
$LnCUR$	2002Q3	-2.378	2014Q1	-2.957	2013Q1	-2.941
$\Delta LnCUR$	2015Q4	-8.915*	2015Q2	-8.400	2015Q4	-9.084*
$LnTRNSF$	2002Q4	5.313	2004Q1	-3.641	**2002Q4**	-4.873
$\Delta LnTRNSF$	**2007Q4**	-5.259**	**2010Q2**	-4.760**	2003Q4	-6.435*
$Ln(N/Y)$	2003Q4	-5.292	2006Q1	-4.318	2003Q4	-5.128
$\Delta Ln(N/Y)$	**2010Q1**	-9.113*	**2002Q2**	-7.812*	**2010Q1**	-8.957*

1. Co-integration Test

Long-run relationship: ARDL M1 to M10

Table 3: Bound F-test for Cointegration

Models	Dependent Variable	Function	*F*-test statistic	*t* -statistic	N
Set A					
1	$\ln(y/N)$	$\ln(y/N) \mid (\ln EDU, \ln HEA, \ln SOC, \ln(N/Y))$	7.679**	-5.289*	63
2	$\ln EDU$	$\ln EDU \mid (\ln(y/N), \ln HEA, \ln SOC, \ln(N/Y))$	7.869*		57
3	$\ln HEA$	$\ln HEA \mid (\ln(y/N), \ln EDU, \ln SOC, \ln(N/Y))$	12.615*		57
4	$\ln SOC$	$\ln SOC \mid (\ln(y/N), \ln EDU, \ln HEA, \ln(N/Y))$	1.772	-0.806	60
5	$\ln(N/Y)$	$\ln(N/Y) \mid (\ln(y/N), \ln EDU, \ln HEA, \ln SOC)$	7.719*		60
Set B					
6	$\ln(Y/N)$	$\ln(Y/N) \mid (\ln CAP, \ln CUR, \ln TRNSF, \ln(N/Y))$	3.402***		63
7	$\ln CAP$	$\ln CAP \mid (\ln(y/N), \ln CUR, \ln TRNSF, \ln(N/Y))$	2.004		63
8	$\ln CUR$	$\ln CUR \mid (\ln(y/N), \ln CAP, \ln TRNSF, \ln(N/Y))$	29.210*	-6.459*	61
9	$\ln TRNSF$	$\ln TRNSF \mid (\ln(y/N), \ln CAP, \ln CUR, \ln(N/Y))$	11.059*	-4.154***	58
10	$\ln(N/Y)$	$\ln(N/Y) \mid (\ln(y/N), \ln CAP, \ln CUR, \ln TRNSF)$	17.784	5.066*	58

*Note: *, **, *** denotes significance at 1%,5% and 10%. N = Sample size.*

Bounds-test CVs are those by Eviews 10, provided by Narayan (2005). CVs for models 1, 2, 8, 9 and 10 are estimated as Case 5, with unrestricted constant and unrestricted trend; models 3,4, 5 and 6 are computed as Case 2, with restricted constant and no trend, and model 7 is estimated based on Case 4, with unrestricted constant and restricted trend

2. Direction of Causality: ARDL–ECM method
Long-run and short-run relations: M1 to M5

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Table 4a: ARDL ECM-based Causality Test Result

Set A						
	Short-run causality *F*-statistic (p-value)					Long-run causality (ECM_{t-1})
Dependent Variable	$\Delta \ln(y/N)$	$\Delta \ln EDU$	$\Delta \ln HEA$	$\Delta \ln SOC$	$\Delta \ln(N/Y)$	ECM Coefficient [t-statistic]
$\Delta \ln(y/N)$	-	4.504 (0.04)**	2.510 (0.12)	-	0.047 (0.83)	-0.21 (0.00) [-6.449]*
$\Delta \ln EDU$	3.127 (0.02)**	-	135.326 (0.00)*	19.364 (0.00)*	27.842 (0.00)*	-0.54(0.00) [-7.722]*
$\Delta \ln HEA$	3.841 (0.01)*	18.155 (0.00)*	NA	6.761 (0.00)*	5.301 (0.00)*	-0.82(0.00) [-9.967)
$\Delta \ln SOC$	16.748 (0.00)*	56.320 (0.00)*	2.338 (0.07)***	-	4.178 (0.01)*	*No LR*
$\Delta \ln(N/Y)$	26.539 (0.00)*	9.024 (0.00)*	-	-	-	-0.06(0.00) [-7.199]

*Note: *, **, *** denotes significance at 1%,5% and 10%. N = Sample size.*

2. Direction of Causality: ARDL–ECM method
Long-run and short-run relations: M6 to M10

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Table 4b: ARDL ECM-based Causality Test Result

Set B						
	Short-run causality: *F*-statistic (p-value)					Long-run causality (ECM_{t-1})
Dependent Variable	$\Delta \ln(y/N)$	$\Delta \ln CAP$	$\Delta \ln CUR$	$\Delta \ln TRNSF$	$\Delta \ln(N/Y)$	ECM Coefficient [t-statistic]
$\Delta \ln(y/N)$	NA	6.552 (0.01)*	5982 (0.01)*	3.162 (0.08)***	1.526 (0.22)	-0.02(0.00) [-4.752]*
$\Delta \ln CAP$	4.140 (0.04)**	-	5.262 (0.02)**	-	-	*No LR*
$\Delta \ln CUR$	11.680 (0.00)*	-	-	1.9444 (0.17)	4.071 (0.01)*	-0.02 (0.00) [-13.970]*
$\Delta \ln TRNSF$	10.631 (0.00)*	0.799 (0.53)	1.394 (0.25)	-	4.358 (0.00)*	-0.33(0.00) [-7.901]*
$\Delta \ln(N/Y)$	-	-	7.294 (0.00)*	6.670 (0.00)*	-	-0.02 (0.00) [-7.566]*

*Note: *, **, *** denotes significance at 1%,5% and 10%.*

3a. Non-parametric Linear Causality test:

Toda-Yamamoto non-Granger causality test

Short-run causative links: M1 to M5

Table 5a: Linear **Granger Causality – Toda-Yamamoto non-Granger Causality Test**

Set A

Model	Cause	Effect	Test statistic (χ^2)	p-value	Inference from $\longrightarrow$ to
1	$\ln(y/N)$	$\ln HEA$	1.441	0.919	$(y/N) \neq HEA$
		$\ln EDU$	1.727	0.885	$(y/N) \neq EDU$
		$\ln SOC$	0.559	0.989	$(y/N) \neq SOC$
		$\ln(N/Y)$	3.831	0.574	$(y/N) \neq (N/Y)$
2	$\ln EDU$	$\ln(y/N)$	9.553	0.089***	$EDU \rightarrow (y/N)$
		$\ln HEA$	17.369	0.003*	$EDU \longrightarrow HEA$
		$\ln SOC$	3.099	0.685	$EDU \neq SOC$
		$\ln(N/Y)$	1.118	0.952	$EDU \neq (N/Y)$
3	$\ln HEA$	$\ln(y/N)$	7.789	0.168	$HEA \neq (y/N)$
		$\ln SOC$	5.494	0.358	$HEA \neq SOC$
		$\ln EDU$	5.542	0.353	$HEA \neq EDU$
		$\ln(N/Y)$	4.096	0.535	$HEA \neq (N/Y)$
4	$\ln SOC$	$\ln(y/N)$	40.759	0.000*	$SOC \rightarrow (y/N)$
		$\ln HEA$	2.069	0.839	$SOC \neq HEA$
		$\ln EDU$	6.338	0.247	$SOC \neq EDU$
		$\ln(N/Y)$	15.647	0.007*	$SOC \rightarrow (N/Y)$
5	$\ln(N/Y)$	$\ln(y/N)$	21.123	0.001*	$(N/Y) \rightarrow (y/N)$
		$\ln HEA$	1.673	0.892	$(N/Y) \neq HEA$
		$\ln SOC$	4.201	0.520	$(N/Y) \neq SOC$
		$\ln EDU$	0.521	0.952	$(N/Y) \neq EDU$

*Note: *, **, *** denotes significance at 1%,5% and 10%.*

3b. Non-parametric Linear Causality test:

Toda-Yamamoto non-Granger causality test

Short-run causative links: M6 to M10

Table 5b: Linear **Granger Causality – Toda-Yamamoto non-Granger Causality Test**

Set B

Model	Cause	Effect	Test statistic (χ^2)	p-value	Inference from $\longrightarrow$ to
6	$\ln(y/N)$	$\ln CAP$	5.879	0.318	$(y/N) \neq CAP$
		$\ln CUR$	3.379	0.642	$(y/N) \neq CUR$
		$\ln TRNSF$	0.818	0.976	$(y/N) \neq TRNSF$
		$\ln(N/Y)$	6.383	0.271	$(y/N) \neq (N/Y)$
7	$\ln CAP$	$\ln(y/N)$	3.894	0.564	$CAP \neq (y/N)$
		$\ln CUR$	4.731	0.449	$CAP \neq CUR$
		$\ln TRNSF$	5.627	0.344	$CAP \neq TRNSF$
		$\ln(N/Y)$	4.218	0.518	$CAP \neq (N/Y)$
8	$\ln CUR$	$\ln(y/N)$	4.399	0.493	$CUR \neq (y/N)$
		$\ln CAP$	8.052	0.153	$CUR \neq CAP$
		$\ln TRNSF$	14.955	0.010*	$CUR \longrightarrow TRNSF$
		$\ln(N/Y)$	1.670	0.892	$CUR \neq (N/Y)$
9	$\ln TRNSF$	$\ln(y/N)$	45.057	0.000*	$TRNSF \longrightarrow (y/N)$
		$\ln CAP$	4.907	0.427	$TRNSF \neq CAP$
		$\ln CUR$	11.306	0.045**	$TRNSF \longrightarrow CUR$
		$\ln(N/Y)$	14.125	0.014*	$TRNSF \longrightarrow (N/Y)$
10	$\ln(N/Y)$	$\ln(y/N)$	17.725	0.003*	$(N/Y) \longrightarrow (y/N)$
		$\ln CAP$	4.341	0.501	$(N/Y) \neq CAP$
		$\ln CUR$	3.225	0.665	$(N/Y) \neq CUR$
		$\ln TRNSF$	11.655	0.039**	$(N/Y) \longrightarrow TRNSF$

*Note: *, **, *** denotes significance at 1%,5% and 10%.*

Empirical Findings (1)

- Zivot-Andrews unit root model estimated with 2 dummy variables confirmed that variables are I(1).
- Computed ARDL models are robust - passed relevant diagnostic (ARCH-LM, BG serial correlation and Jacque-Bera) and stability tests (CUSUM).
- **Cointegration results confirm long-run relationships** among all the disaggregated real PGEs, PGDP and population per capita, except in the models where social development and capital expenditures, are treated as exogenous variables.
- In the presence of an external shock, 82%, 54%, 21% and 6% of the disequilibrium in the models where – real expenditures on Health, Education, real GDP (per capita) and population per capita – variables are treated exogenously, are corrected respectively, in the next period.
- **On long-run causative process (ARDL models 1 to 5)**
  - Bi-directional causality between real PGE on education & GDP per capita.
  - Unidirectional causality from real PGE on output productivity and economic activities level. health, social development and population per capita to real GDP, consistent with Keynesian theory.
  - Overall, empirical results is consistent with endogenous theory (Barro, 1990), keeping with those in the literature.

Empirical Findings (2)

- **On short-run relations** based on causative process (ARDL – ECM)
  - Unidirectional causal flow from real GDP (per capita) to social expenditures (i.e. health, education and social development), consistent with Wagner's theory
  - Bi-directional causality between expenditure on education and real GDP
  - Bi-directional causality between population per capita and education expenditure
  - Bi-directional causality between education, health and social expenditure running interactively via real GDP per capita.
- **On long-run causality (ARDL Models 6 to 10)**
  - In the presence of an external shock, 33% of the disequilibrium in the transfers & subsidies model is corrected in the next period, while there is a very slow-mean revision (of about 2%) in the real GDP per capita, current expenditure and population per capita models.
  - Bi-directional causality between real GDP per capita and PGEs on: capital, current, transfers and subsidies.
- **On short-run relations** based on causative process (ARDL – ECM)
  - Bi-directional causality between PGE on capital, current and transfers & subsidies

Policy Implications of Empirical results

- Determinant of real GDP growth are: government expenditures on: education and health, current, transfers and subsidies.
- Budgetary cuts in social services (health and education) and current expenditures can dampen real GDP growth – lowers economic activity level
- Increase in population growth per capita has considerable impact on real GDP growth.
- Inexistence long-run relationship between government expenditure on social development, capital (assets), transfers and subsidies, indicative of institutional constraints and deficient of key ingredients to spur economic activity.
  - In effective PEP initiatives, e.g., EPWP with low labour intensity ratio.
  - Low / little capital infrastructure investment– indirectly support growth
  - Absence of private sector participation – engine of growth, productivity, technical and financial know-how (projects) and diffusion of technological gain.
- Other constraints - Inadequate institutional and fiscal oversight due to rising (i) wage bill and (ii) wasteful expenditure.

Important Policy Prescriptions

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- Policy makers need to actively monitor fiscal allocations on education and current expenditures.
  - Prevent productive expenditures from becoming unproductive
- Increase institutional oversight and investment on health infrastructures, capital asset and PEP related social development initiatives such as EPWP & CWP.
  - Focus on capital asset maintenance, instead of embarking on new capital projects
  - Create transitory jobs to mitigate the severe high unemployment and poverty rate
- Re-evaluate current PPP strategies
  - Encourage participation of the private sectors in the domestic economy, to allow diffusion of technological, managerial and financial skills needed to indirectly raise output & productivity growth, and labour absorption rate (creating job opportunities) to reduce persistently high unemployment rate.
- Provide subsidies to privates enterprises to encourage private sector participation to achieve higher growth and fiscal sustainability
- Invest on R&D to build sustainable human capital stock.
  - Unlock innovativeness on new area of growth-inducing businesses & capital projects
  - Spur the establishment of micro-enterprises & self-employment.

Final Remarks

- In this study, we have provide concrete results showing:
  - The Existence of a feedback relationship between GDP and major components of budgetary allocation. On this basis, we find no evidence supporting Wagner's or Keynesian theories, rather both hypothesis interactively underpins economic growth patterns in the FS – a dynamic and complex relationship.
- To implement an effective macroeconomic and fiscal policies to facilitate economic growth in FS; the provincial government need to consider the intricate relationships between economic growth and its expenditure patterns. A knee-jerk reaction on budget cuts and allocation reduction to social expenditures will most likely hamper GDP growth and/or erodes productivity gains.
- Vibrant economic growth in the FS is heavily dependent on educated and healthy workforce, consistent with endogenous theory.
- Urgent institution willingness and intervention is imperative to drive accumulation of capital and human stock (R&D).

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THANK YOU

QUESTION SESSION

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