

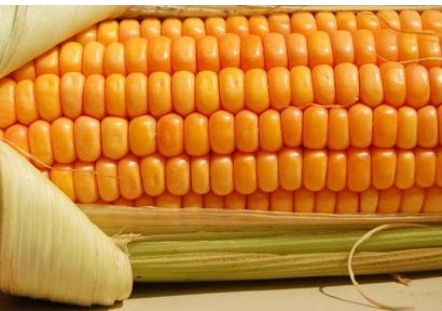


National Agricultural
Marketing Council
Promoting market access for South African agriculture

DETERMINING THE AGRICULTURAL OUTPUT GAP AND ITS LINK WITH FOOD PRICE DYNAMICS IN SOUTH AFRICA

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PRESENTATION OUTLINE

1. INTRODUCTION

2. LITERATURE REVIEW

3. METHODOLOGY DESCRIPTION

4. DATA COLLECTION

5. RESULTS AND ANALYSIS

6. CONCLUSIONS & RECOMMENDATIONS

INTRODUCTION

- SA has a flexi-inflation targeting framework.
- Output gap and potential output– important inflationary pressure measures.
- Determine policies on interest rates (Ehler *et al*, 2013; Kemp, 2013).
- SA – existing body of literature on measurement of overall output gap.
- Little work done on the agricultural sector output gap.

INTRODUCTION cont...

- Output gap – difference (+ve / -ve) between actual output and potential output (McMorrow & Roger, 2002).
- Output gap analysis done to identify inflationary or non-inflationary growth & effect on macroeconomic policies in an economy (Denis *et al*, 2002).
- South African Reserve Bank and some universities.
- Determine output gap and inflationary pressures within SA's agricultural sector.

LITERATURE REVIEW

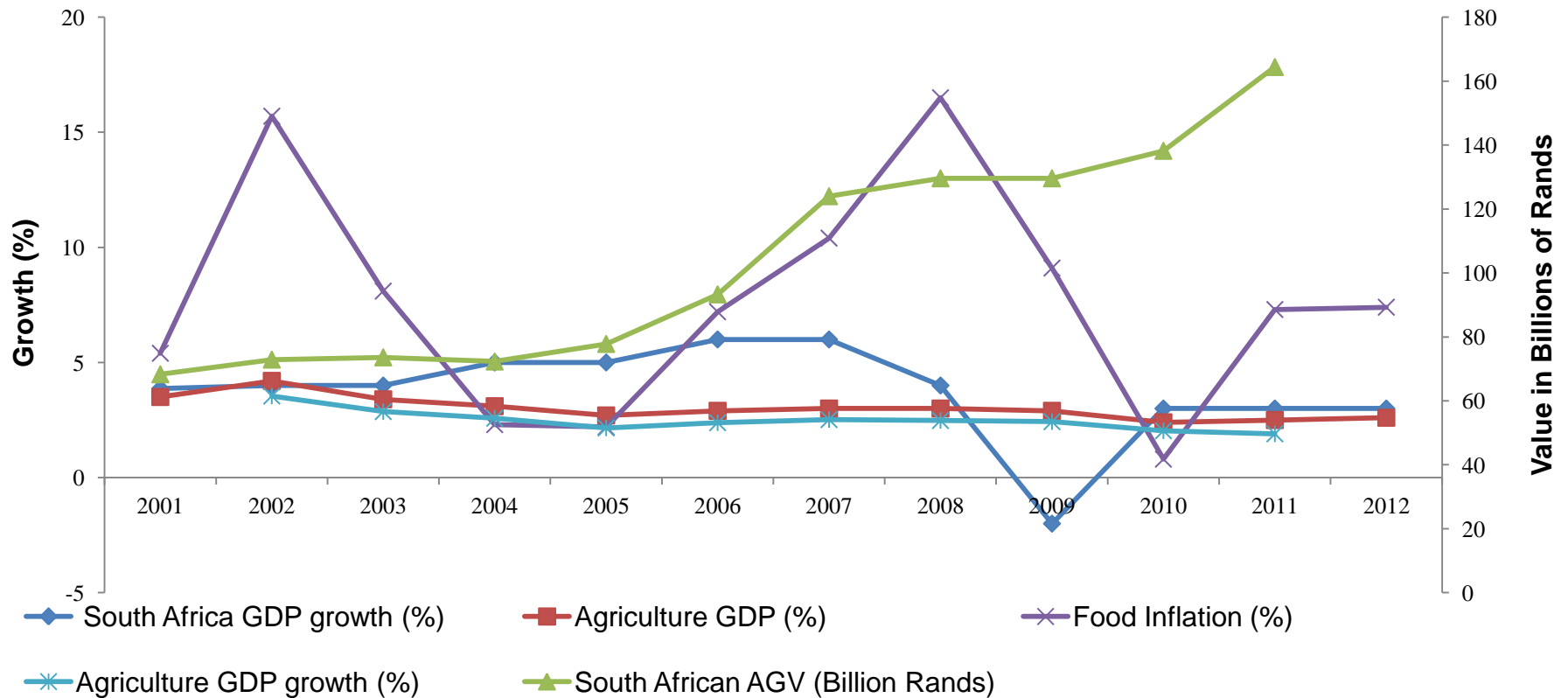
- A number of studies conducted on output gap to advise governments on appropriate monetary policy measures
- de Brouwer 1998; Dupasquier, Guay & St-Amant 1999; Scacciavillani and Swagel 1999; and Cerra and Saxena 2000; Laxton and Tetlow 1992; Nelson and Plosser 1982; Smit *et al* , 2002; Ehler *et al* 2013.

LITERATURE REVIEW cont...

- The output gap argument
 - Actual output – Potential output = output gap
 - Actual output reported by national statistics offices
 - Potential output not observable, measures productive capacity of an economy.
 - Positive output gap indicates demand pressures in key markets hence increased inflationary pressures (over-utilization of resources).
 - Negative output gap- excess capacity & gross underutilization of resources, hence reduced inflationary pressures.

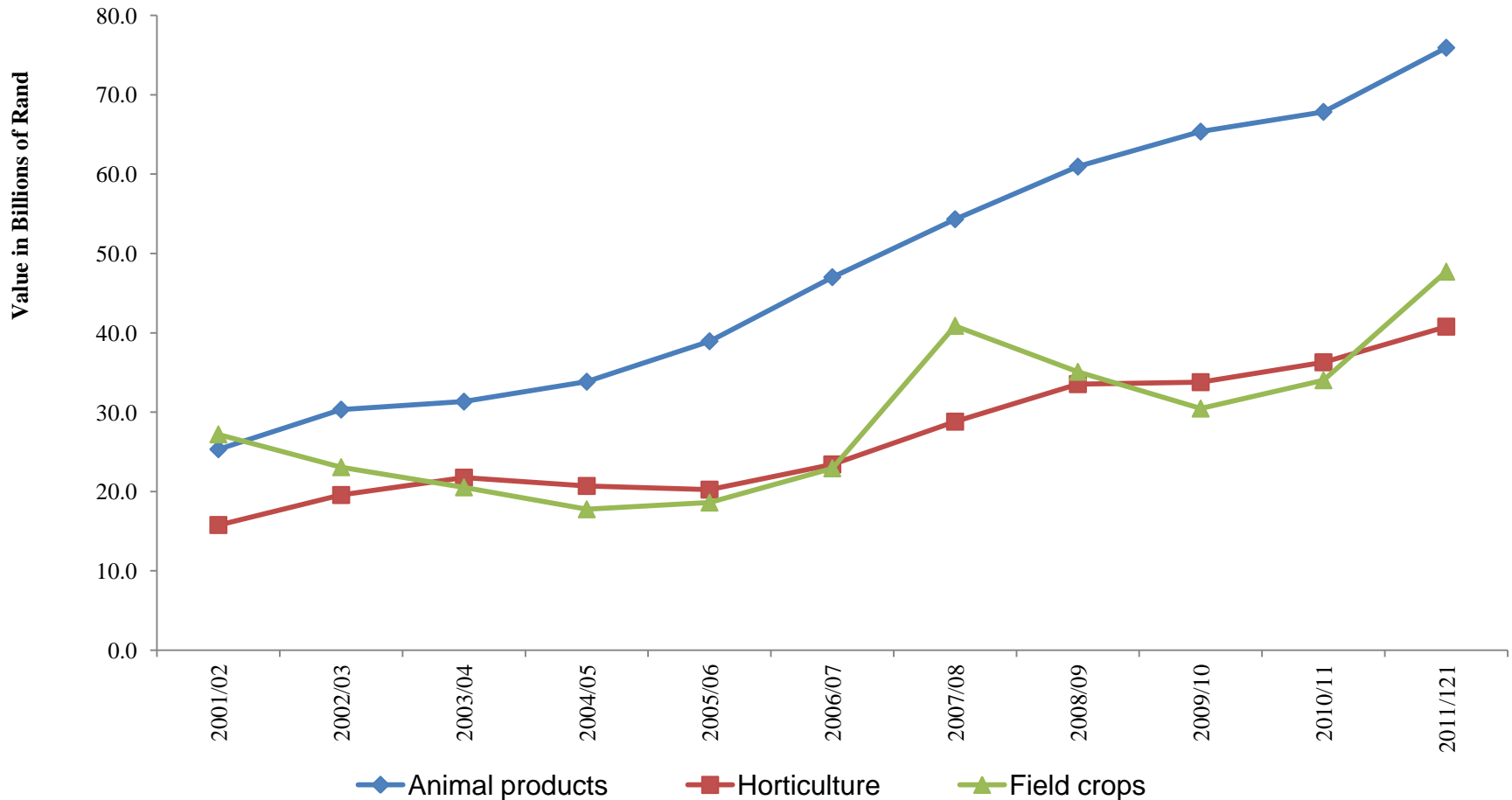
LITERATURE REVIEW cont...

- SA's agricultural output trends:



LITERATURE REVIEW cont...

- SA's agricultural output trends:



METHODOLOGY

- Linear trend method

$$Y_t^* = \hat{a}_0 + \hat{a}_i \text{Trend} \quad (1)$$

- Y_t^* - output trend,
- \hat{a}_i , $i = 0, 1$ - estimated coefficients from the regression of the actual output on time trend variable.

Then output gap (C_t) is obtained using:

$$C_t = Y_t - Y_t^* \quad (2)$$

- Y_t - actual output,
- Y_t^* - potential output from (1), and $t = 1, 2, \dots$,
- t - time index.

METHODOLOGY cont...

- **Hodrick-Prescott (HP) Filter method**
- ✓ assumption that growth component varies smoothly over time.

$$Y_t = Y_t^* + C_t \quad (3)$$

$$\begin{aligned} \text{Min } L &= \{ \sum_{t=1}^T c_t^2 + \lambda \sum_{t=2}^T (\Delta y_t^* - \Delta y_{t-1}^*)^2 \} \\ &= \sum_{t=1}^T (y_t - y_t^*)^2 + \lambda \sum_{t=2}^T [(y_t^* - y_{t-1}^*) - (y_{t-1}^* - y_{t-2}^*)]^2 \end{aligned} \quad (4)$$

- ✓ Parameter λ is positive & takes values 100 or 1600

METHODOLOGY cont...

- **The Production Function**

- ✓ Structural approach

- ✓ Relates the potential output to the availability of factors of production and technological change.

- ✓ The Cobb-Douglas production function used to characterise the total output.

METHODOLOGY cont...

- **The Production Function cont...**

$$Y = L^\alpha K^{1-\alpha} \cdot \text{TFP} \quad (5)$$

Y is the output, L is the labour employed, K is the capital stock, TFP is the total factor productivity and α is the labour share of income.

$$\text{TFP is defined as equal to: } \text{TFP} = (E_L^\alpha E_K^{\alpha-1})(U_L^\alpha U_K^{1-\alpha}) \quad (6)$$

U= degree of utilisation of factor inputs

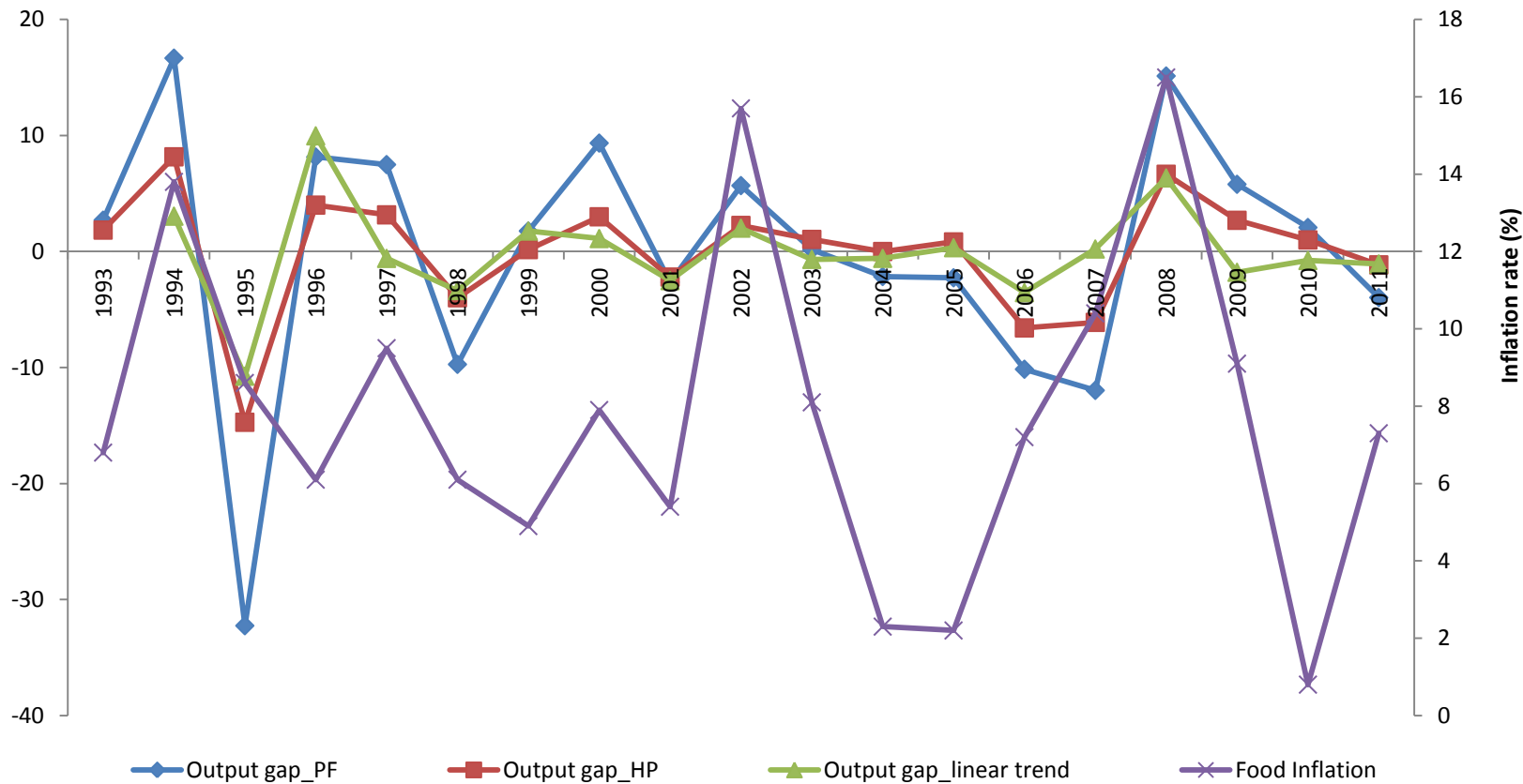
E= technological level

$$\log(\text{TFP}_t) = \log(Y_t) - \alpha \log(L_t) - (1 - \alpha) \log(K_t) \quad (7)$$

DATA COLLECTION

- Secondary data (1993-2011) obtained from Statistics South Africa used:
 - ✓ Annual agriculture Gross Domestic Product
 - ✓ Agricultural capital stock
 - ✓ Agricultural employment
 - ✓ Food inflation rate

EMPIRICAL ESTIMATES OF POTENTIAL OUTPUT AND OUTPUT GAP



EMPIRICAL ESTIMATES OF POTENTIAL OUTPUT AND OUTPUT GAP

- **Below potential:** SA's agricultural sector operating below potential in 1995, 1998, 2001, 2004-2007 and 2011.
- Underutilization of available resources during these time periods.
- Theoretically, food inflation rates should decrease.
- However, in SA food inflation rates above SARB upper bound rate of 6%

EMPIRICAL ESTIMATES OF POTENTIAL OUTPUT AND OUTPUT GAP

- **Above potential:** SA's agricultural sector operating below potential in 1993, 1994, 1996-1997, 2000, 2002-2003 and 2008-2009.
- Excess demand that leads to inflationary pressures (Claus, 2000).
- SA food inflation rates above SARB upper bound rate of 6%
- Overutilization of available resources

FOOD INFLATION & OUTPUT GAP

		Food Inflation	Output gap_linear trend	Output gap_HP	Output gap_PF
Food Inflation	Pearson Correlation	1	.985**	.646**	.310
	Sig. (1-tailed)		.000	.001	.098
	N	19	19	19	19
Output gap_linear trend	Pearson Correlation	.985**	1	.698**	.261
	Sig. (1-tailed)	.000		.000	.140
	N	19	19	19	19
Output gap_HP	Pearson Correlation	.646**	.698**	1	-.485*
	Sig. (1-tailed)	.001	.000		.018
	N	19	19	19	19
Output gap_PF	Pearson Correlation	.310	.261	-.485*	1
	Sig. (1-tailed)	.098	.140	.018	
	N	19	19	19	19

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).

CONCLUSIONS AND RECOMMENDATIONS

- Positive significant relationship between agricultural output gap and food inflation.
- Sector under excessive demand, agricultural GDP higher than it can be supported by existing capital and labour resources.
- Since overall agric GDP was used, it is recommended that, in order to properly inform policy, different production regions and subsectors be done to ascertain major contributors to output gap.

THANK YOU