National Agricultural Marketing Council

Promoting market access for South African agriculture

Policy insights from productivity growth of SA Table grape industry, 2010-2020

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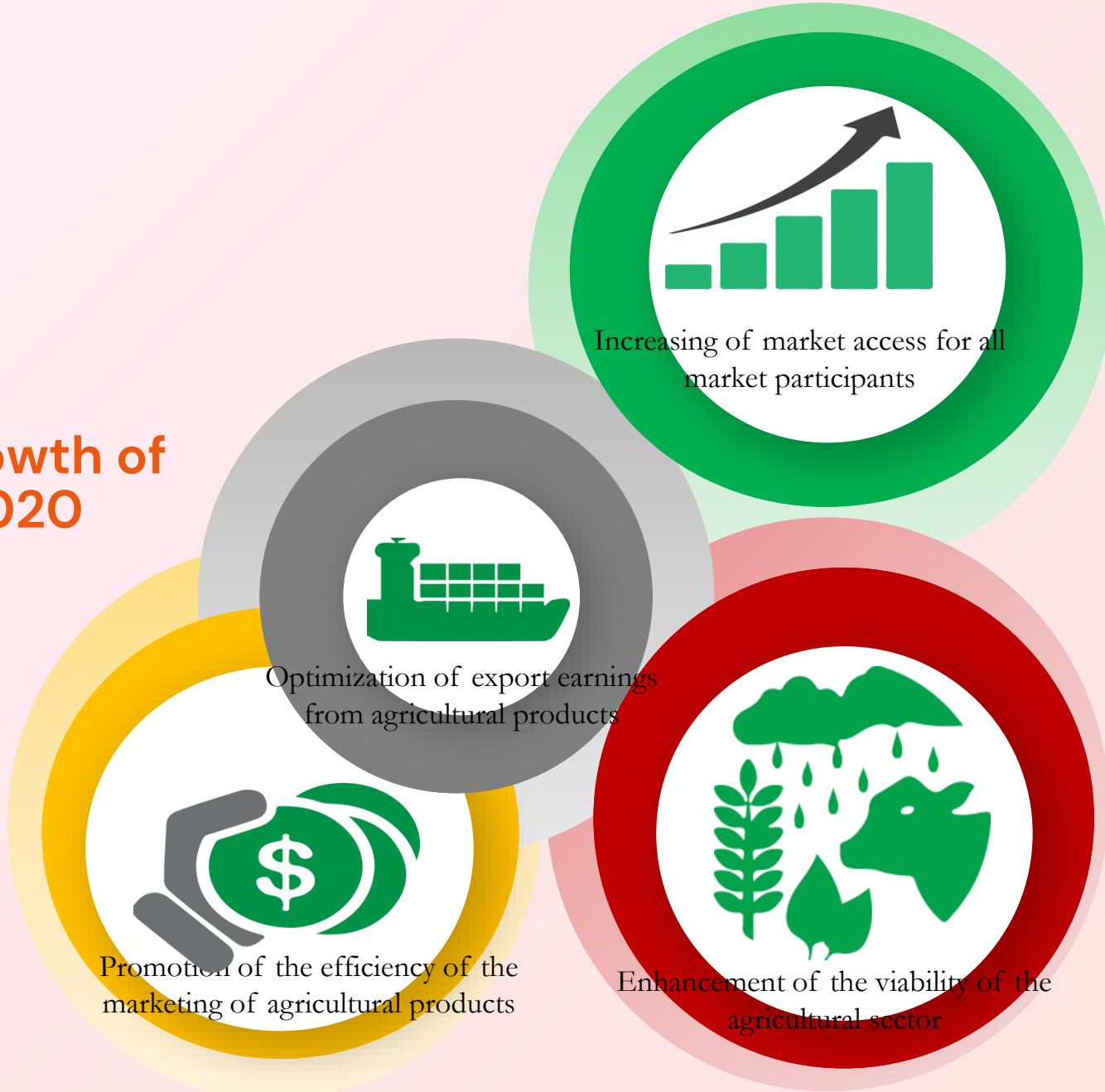


Presentation Outline

- Research motivation
- Data information
- Estimation procedure
- Findings & Discussion
- Conclusion
- Policy considerations

Research motivation

- SA table grape industry plays a significant role in both local and international economy.
  - **3rd largest producer** of table grapes **in Southern hemisphere.**
  - **7th largest exporter of table grapes in the world.**
- Productivity in South African table grape industry means:
  - Food security, employment creation, income generation, foreign earnings.
  - Productivity analysis can provide key insights for farm managers and policymakers towards **improvements in the competitiveness**.

Research motivation

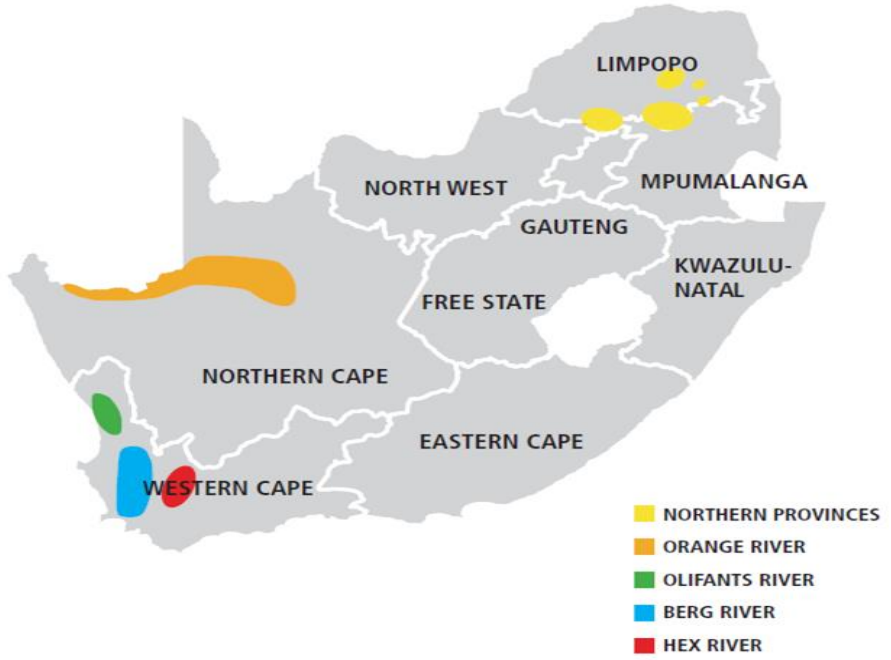
- National & Continental Policy framework in relation to SA table grape industry:
  - APAP & AAMP identifies SA table grape industry labour intensive – potential for **more job creation**.
  - NDP 2030 – **1 million jobs** from agriculture sector.
  - African Continental Free Trade Area (AfCFTA) – **improvement in productivity.**
- Academic Perspective – there are few studies:
  - **Internationally**: Santos et al. (2020), Moreira et al. (2011) & Coelli and Sanders (2013)
  - **Locally:** Conradie (2014), Conradie et al (2019), Myeki et al (2019) – **productivity remains inconclusive**. Silent on mix efficiency.
- NAMC Strategic objectives
  - To enhance the viability of the agricultural sector.

Data Information

- **Source:** Data compiled using annual reports from South African Table Grapes Industry (SATI) website
- **5 major regions** over **10 years** (2009/10 to 2019/2019), 55 observations

Variable	Mean	Standard deviation
Output (in quantity of 4.5 kg cartons)	11,958,398	6,933,277
Land (in hectares)	3,566	2,022
Labour (no. of full- and part-time)	12,864	6,455
Other Costs* (Rands)	311,483	152,466

Source: South Africa's Table grape industry (SATI) website
***Other costs** includes Fertiliser & Organic Material, Pesticide & Herbicide Control, Fuel Oil Repairs Parts & Maintenance, Water, electricity, etc



Berg River - offers the water, and the Cape's famous mild Mediterranean climate helps to produce mid-season grapes of exceptional quality.

Hex River Valley - Snow falls regularly during winter providing unique climate for mid-season to late-season grapes.

Northern Provinces - early summer and warm climate combine to produce early maturing varieties.

Olifants River - Small table grape region sustained by pure mountain water flowing down through lush valleys and kloofs before reaching famous Namaqualand West Coast.

Orange River - sunny winter days and hot, dry summers, vines that thrive in rich desert soils, all combine to produce the sweetest grapes imaginable.

Estimation Procedure

- **Table grape industry is multiple input and output.** Thus, O'Donnell (2011):

$$TFP_{it} = Q_{it}/X_{it}$$

where TFP = total factor productivity, *Qit* = *Q*(*qit*) is an aggregate output, *Xit* = *X*(*xit*) is an aggregate input.

$$TFP_{hs,it} = \frac{TFP_{it}}{TFP_{hs}} = \frac{Q_{it}/X_{it}}{Q_{hs}/X_{hs}} = \frac{Q_{it}/Q_{hs}}{X_{it}/X_{hs}} = \frac{Q_{hs,it}}{X_{hs,it}}$$

Consequently, the TFP is broken down into:

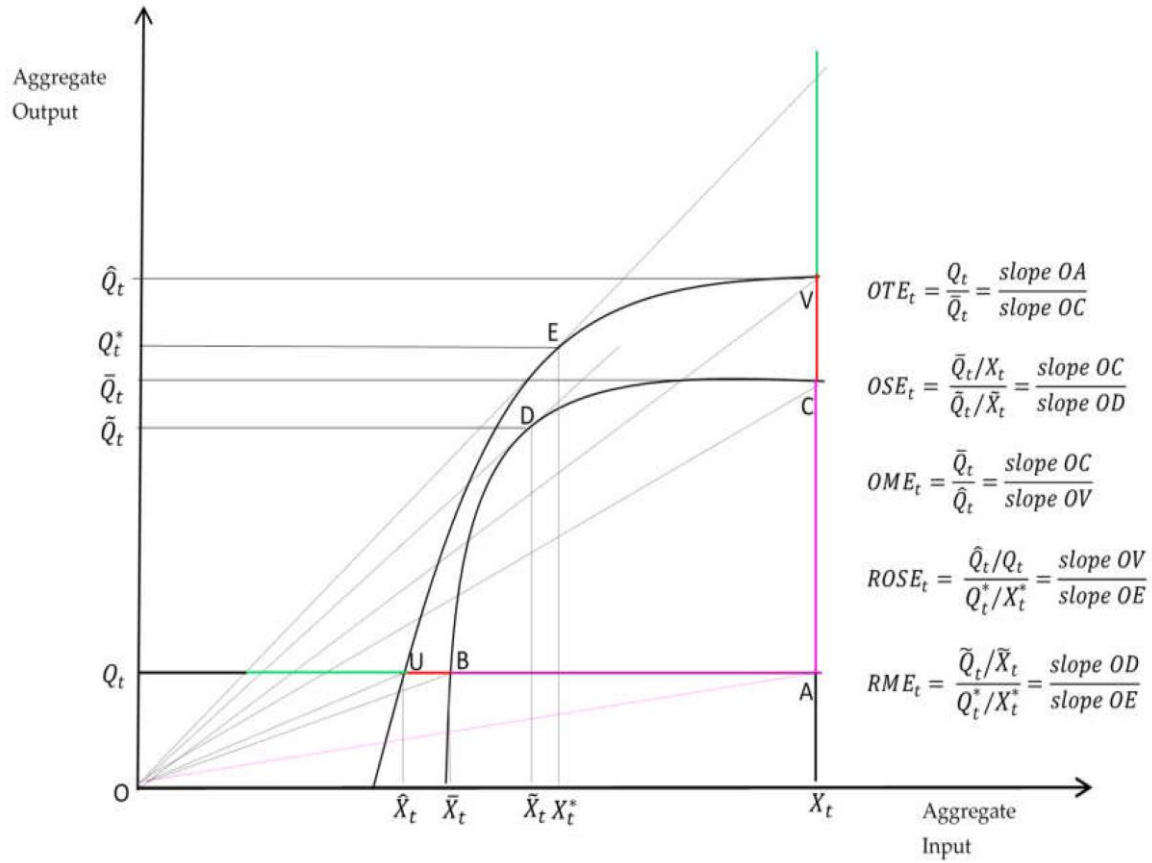
$$TFP_{hs,it} = \left(\frac{TFP_t^*}{TFP_s^*}\right)\left(\frac{TFPE_{it}}{TFPE_{hs}}\right)$$

- Efficiency changes: **output technical efficiency change** (OTE), **scale efficiency change** (OSE), **residual mix efficiency change** (RME):

$$TFP_{hs,it} = \left(\frac{TFP_t^*}{TFP_s^*}\right)\left(\frac{OTE_{it}}{OTE_{hs}}\right)\left(\frac{OSE_{it}}{OSE_{hs}}\right)\left(\frac{RME_{it}}{RME_{hs}}\right)$$

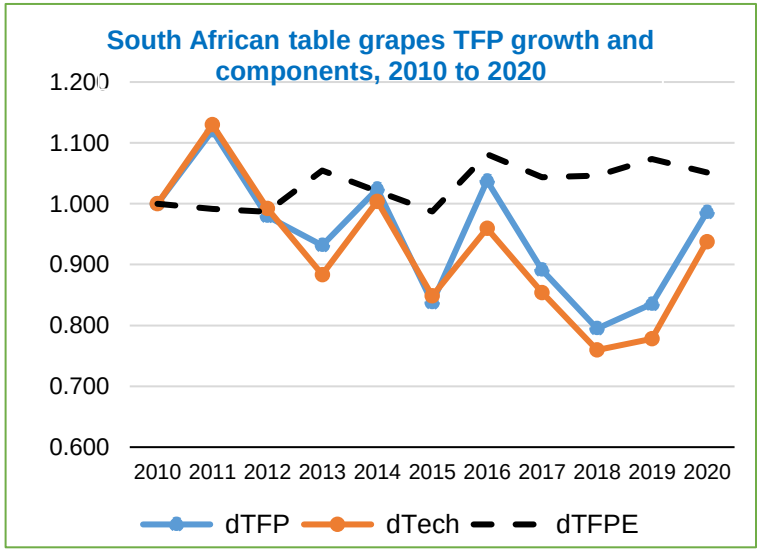
- **Färe-Primont index is reliable** as compared to other indices.

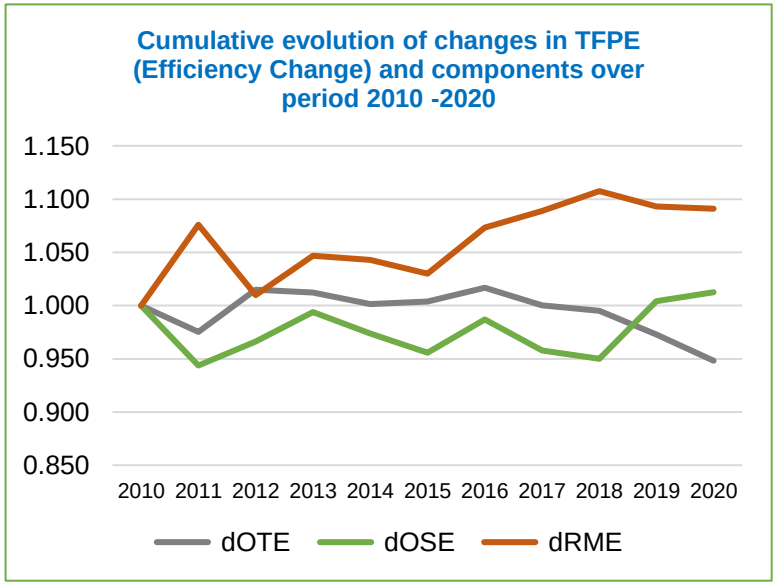
- **DIPIN** – Software



Findings & Discussion

- **TFP declined** at an average rate of 0.13% p.a due to **technological regress** (0.58% p.a), but **efficiency change** was positive (0.46% p.a).
  - What do we do? Ans: **R&D investment – Levy expenditure.**
  - **Highest: 2011 (TFP =1.12%) and Lowest: 2018 (TFP =0.78%).**
- As expected, **the largest decline in TFP was experienced during** 2015/16 to 2017/18 **(drought period).**
- **Mix efficiency (RME)** was the major source of TFP growth, something that **previous studies have not investigated**.
  - Industry should pay attention to **OSE & OTE**
  - **OTE** = Extension Support programmes, Training; **OSE** = agro-climatic conditions, Input prices, & farm size (land reform).





Findings & Discussion

- **TFP declined by 1.4% over the study period**, due to **technological regress (6.2%)**.
- **Pre-drought** there was a **positive TFP growth (3.8%)** due to **positive TFPE**, whilst **TC was negative** (6.2%).
- **During the drought period** (2016 and 2018), **TFP declined by 24.3%**. This is was largely **due to technical regress (20%)**.
- **Post-drought period** (2018 to 2020) experienced a **significant TFP growth of 19.1%**, largely due to **technological progress of 17.8%.**

Period	TFP	TC	TFPE	OTE	OSE	RME
Study period (2010 to 2020)	**-1.4%**	**-6.2%**	**5.1%**	**-5.2%**	**1.3%**	**9.1%**
Pre-drought (2010 to 2016)	**3.8%**	**-4.1%**	**8.2%**	**1.7%**	**-1.3%**	**7.3%**
Drought years (2016 to 2018)	**-24.3%**	**-20.0%**	**-3.5%**	**-2.1%**	**-3.7%**	**3.4%**
Post-drought (2018 to 2020)	**19.1%**	**17.8%**	**0.5%**	**-4.7%**	**6.3%**	**-1.7%**

Findings & Discussion

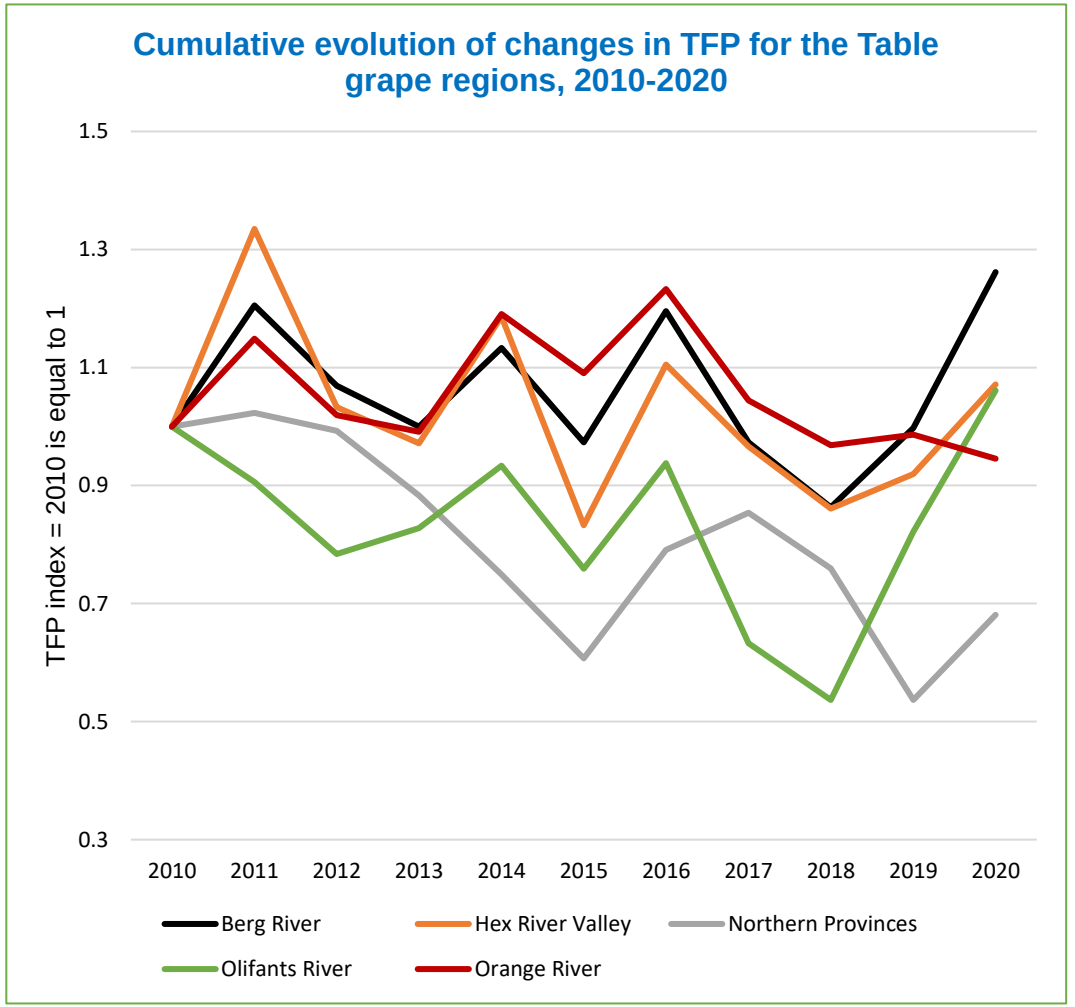
- Berg River (2.13%) and Hex River Valley (0.63%), **were the most productive.**

  experience and advanced technology adoption in those regions

- **During the drought years**, Olifants River experienced the largest decline in TFP:

  - **Water allocations to irrigators in the region were curtailed by 76% for the 2017/18 season** resulting in a significant decline in agricultural production (Green Agri, 2018).
  - Northern region is characterised by subtropical climate with great levels of humidity and **table grape do not thrive very well in such climate as compared to Western Cape (SAGTI, 2019)**.

- Most table grape regions have been **recovering in the last two periods.**



Findings & Discussion

- Berg River (26.2%), Hex River Valley (8.1%) and Olifants River (6.6%) **were the most productive**.
- **Northern Provinces and Orange River had a negative TFP decline** of 42.9% and 5.7%,, respectively.
- **During Drought – regions experienced a negative TFP:**
  - Berg River, Hex River Valley and Olifants River **experiencing the biggest impact of drought.**
  - **Water restrictions** and **high tariffs in Western Cape contributed to high production costs**
  - The **drought affected quantity and quality of the grapes including**, berry size, weight and colour development

Region	Whole period (2010-2020)	Pre-drought (2010-2016)	Drought period (2016-2018)	Post-drought (2018-2020)
Berg River	**26.2%**	**19.6%**	**-33.3%**	**40%**
Hex River Valley	**8.1%**	**12.0%**	**-27.8%**	**24%**
Northern Provinces	**-42.9%**	**-28.1%**	**-4.3%**	**-11%**
Olifants River	**6.6%**	**-6.7%**	**-43.1%**	**56%**
Orange River	**-5.7%**	**24.4%**	**-27.7%**	**-2%**

Conclusion

❖ **Study set out to analyze productivity of table grapes industry for policy.**

❖ Productivity (–1.4%): *worrisome finding given the large consumption of resources.*

❖ Technical change (–6.2%): *increase investment in research and developments*
review the current levy allocation on R&D.

❖ **Efficiency change (5.1%):**

- ✓ Technical efficiency (–5.2%): *education, training and extension support programmes.*
- ✓ Scale efficiency (1.3%): farm size, agrarian reform and climate.
- ✓ Mix efficiency (9.1%): input and output prices.

❖ **Summary policy implications: R&D, education, training, extension support, incentives and input–output prices.**

THANK YOU

For more information, contact:

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