

Examining Links between Total Factor Productivity Growth and National Food Supplies: Are there Implications for Food Security and Self-Sufficiency?

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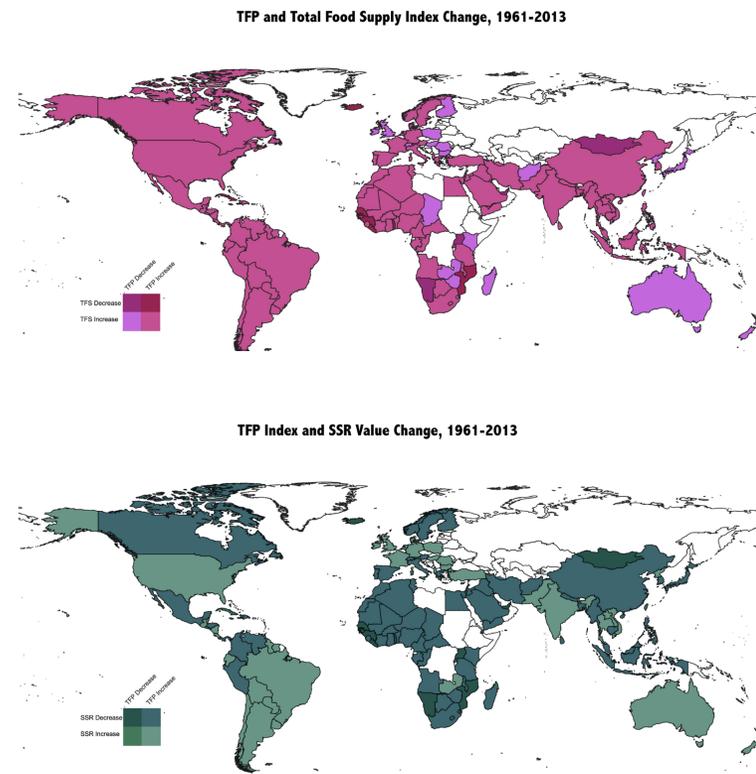
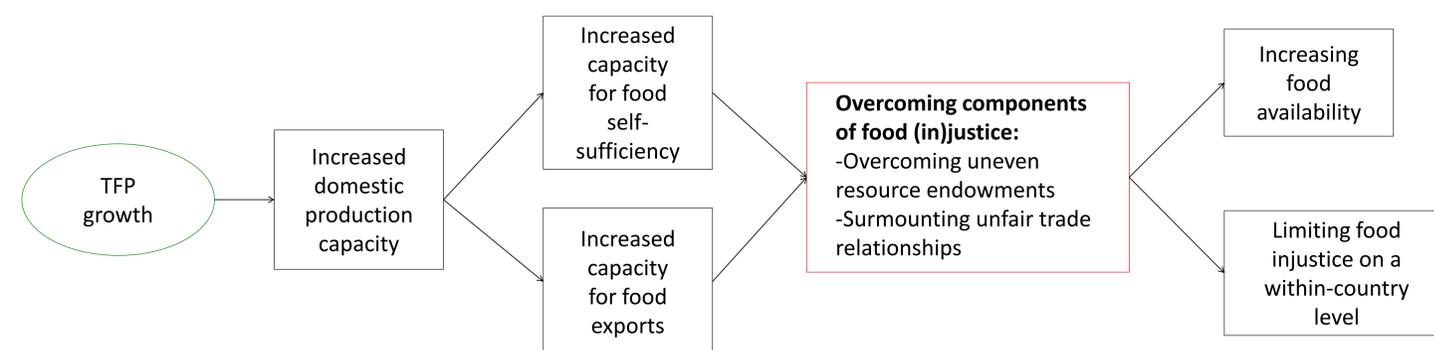
Background

- **Total factor productivity (TFP)** is an economic metric of agricultural production, measuring the ratio of aggregate inputs of land, labor, capital, and material resources used in production to the value of output
- TFP growth is seen as the key strategy in **increasing global food production**, especially as an alternative to agricultural expansion
- Growing concerns in food security literature include greater consideration of the **composition of food supply**, and the role of **food self-sufficiency** in avoiding shocks to food availability (a pillar of food security)

Research Aims

- Address whether TFP, an economic measure, can have a more “humanistic” dimension through its relationship with food availability
- Examine to what extent self-sufficiency status changes alongside TFP
- Understand which crops and areas of food supply are best related to TFP growth, through individual analyses of animal products, cereals, vegetal products, and staple crops

Conceptual Framework



Maps showing relationship between TFP and TFS and TFP and SSR.

Methodology

USDA TFP Index Data

FAO Food Balance Sheet Data:

- 48 items considered
- 35 sugar, oil, and luxury crops excluded based on perceived nutritional value
- 12 marine items excluded due to exclusion from TFP calculations

Total food supply (TFS) and Self Sufficiency Ratio (SSR) calculated for all crops, animal products, vegetable products, cereals, and five staple crops (SSR only)

Visual Analysis of trends using Index plots in R version 3.6.2 from **1961-2013** in **131 countries**

Findings

- The majority of countries experience a TFP increase, and consistency in all-food TFS
- Worldwide, TFP growth best corresponds with an increase in animal product component of total food supply, although few countries increase their animal product SSR
- Many regions that experience the steadiest TFP growth showed marked drops in SSR, while others show spikes in SSR values that indicate strengthened export capacity
- In some countries, consistency in SSR values around 100 coupled with steady TFP growth suggests that TFP can help maintain sufficiency level in the face of population growth

Conclusion

- TFP growth shows the closest associations with individual components of food supply, and is best related to consistency in self-sufficiency levels rather than an increase
- With so many factors contributing to productivity growth and food supply, it is difficult to establish an empirical relationship between these measures. Even so, further research could investigate the mechanisms of relation and strength of statistical association