Title of the Presentation

Agriculture Productivity in North Africa: Terms of Trade, Innovations or Factor Endowments?

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Productivity literature
- Developed countries have undoubtedly experienced technological progress, but the performance of less developed countries has not been so clear (Hayami and Ruttan, 1970; Fulginiti and Perrin, 1993; Fuglie, 2008).
- Sources of the difference: resources endowment, innovation, and human capital.
- The share of agriculture declines over time as economies expands (Anderson, 1987).
- Few studies examines productivity in North Africa (Algeria, Egypt, Morocco, and Tunisia).
- Contribution of agriculture in the economy.
- Productivity gain of 1.6% per year since 1961 (Fuglie, 2010).
- Population growth, trade agreement, and the increase of demand for food put pressure on NA to increase agricultural productivity.
- The social movement of Arab Spring.

Objectives and Contribution
- An empirical model to decompose the evolution of agricultural share of the GDP into three components: price changes, factor endowment changes, and technological change.
- Impact of price and factor endowment shocks on agriculture.
- The result will be key to the understanding of causes of sectoral change in NA.
- The first paper to use dual approach and a heterogeneous dynamic panel to study agricultural productivity in NA.

Theoretical and Empirical Framework
- The restricted aggregate GDP function (Dixit and Norman, 1980; Kohli, 1978; Diewert and Morrison 1998),
  \[ p(y, x_t, t) = \max \{ p_i y_i; \{ y_i, x_i \} \in T \} \quad p_r \in R^7, x \in R^3 \]
  where \( p(y, x_t, t) \) represents the realized profit, \( p_i \) represent output prices, \( y_i \) represents outputs and \( x_t \) represents the inputs. Hotelling’s lemma allows us to express the share of agriculture from a Translog functional form for Equation (1) as follows:
  \[ S_A = a + a_1 \ln p_A + a_2 \ln K + y_A \ln Z + a_Y + a_Y + \epsilon_0 \]
- The Pool Mean Group (PMG) estimator is based on the ARDL(\(q_1,q_2,q_3\)) dynamic heterogeneous panel of Pesaran et al. (1999).

Panel unit root tests
- Panel unit root tests are used to check non-stationarity.
- Price of agricultural and non-agricultural product are constructed using GDP deflators (SNA).
- Capital stock is constructed from investment data using perpetual inventory method.
- Labor is adjusted to account for human capital (PWT version 9).

Results
- Relative price of agricultural product has a positive impact on the share of agriculture.
- Capital-labor ratio and the share of agriculture are negatively correlated which is consistent with Rybczynski Theorem.
- Land-labor ratio has a positive impact on the share of agriculture.
- Technological change is in favor of agriculture in Egypt and Tunisia but not significant for Algeria and Morocco.
- Factor endowment are more relevant than the price effect in the long-run.
- Price shocks have a positive impact on the change of the share for Algeria, Egypt, and Morocco but negative in Tunisia.
- Capital-labor ratio shocks have a positive effect on the change of the share in Egypt and Morocco, and land-labor ratio has positive impact on the change of the share but only for Egypt.

References