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Dynamic Supply Response for Pulses(Pigeon Pea) in India

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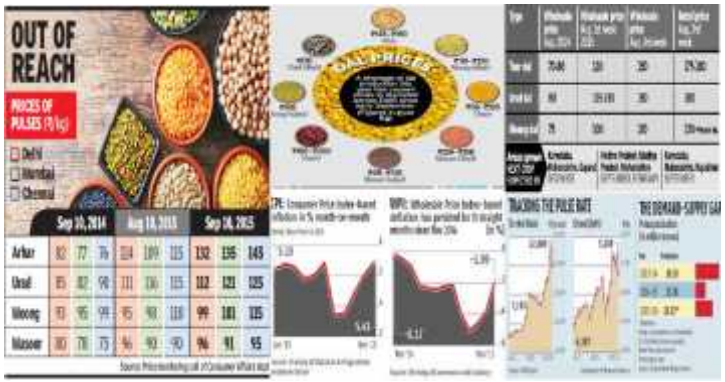
Background

Introduction

- There has been various studies looking at supply responses for different crops. (Mythili, 2012a).But there aren't any studies that look at the supply response specifically for pulses.
- It is this research gap that this study aims to full-fil, specially catering to the dynamic nature of its supply, this study uses Arrelano-Bond, Diff- GMM method which has not been done for pulses before.
- The Pulse sector in India have received a compelling policy attention due to its hyper price fluctuations in recent years.
- The concerns intensify as Indian Dietary composition hugely relies only on pulses for protein intakes.
- In spite of consistently being the leading producer of pulses in the world, India still falls short of meeting its own demand. There is annual deficit of 3-4 millions tonnes of pulses every year[1]Which is imported . India's Position in the World:
  - o 33% of Area
  - o 25% of Production
  - o 27% of Consumption
- Pulses were neglected by the Green revolution.
- Per capita availability is decreasing from 60gr/day in 1950 to 31.6 gm/day in 2011

The News reports from 2015



Why is Supply response critical?

- There has been some evidence of declining consumption of pulses in India but that cannot be equated to declining demand for pulses.
- There is a very thin set of International Suppliers.
- The prices spiralled upwards despite a 27% increase in the imports of pulses in 2014-15 to a high of 4.6 million tonnes(Lingareddy 2015).
- Clearly, there is a need for India to become self-sufficient in pulses.
- Major Government Schemes to bring forth increased supply:
  - o Pulses Development Scheme (4th FYP) (1969-70 to 1973-74)
  - o National Pulses Development Project(7th FYP) (1985-86 to 1989-90)
  - o Special Food Grain production program(1988-89)
  - o NFSM-Pulses (A3P) (2007-08)
  - o Special Plan to achieve 19+ million tonnes of pulse production during khariff (2012-13)

Objective, Data and Methods

- To Study the factors affecting relative area allocation to pulses.
- To provide empirical evidence in term of production
- To analyse Price vs Non-Price factors
  - o If supply is not responsive then why?
- To study if the intensification has been the price response rather than acreage.
- The Dataset is created by combining two secondary datasets.
  - o ICRISAT-VDSA Meso-level Dataset
  - o Plot-level Cost of cultivation dataset of CACP
- ICRISAT VDSA is a comprehensive long district –level panel set on key agricultural and socio-economic variables whereas CACP dataset contains the value of each crop and inputs and their respective quantities which are then used for deriving prices, merged with appropriate district matching with VDSA dataset.
- In the end we have a balanced panel of 305 districts in 18 states over 2005-06 to 2011-12[2].
- We have used Arrellano-Bond, Difference GMM estimation technique specifically designed for "Small T and Large N;2) a linear functional relationship;3) a dynamic left hand side variable depends on its own past realizations". Specially catering to the endogeneity problem within the system.

Findings (1)

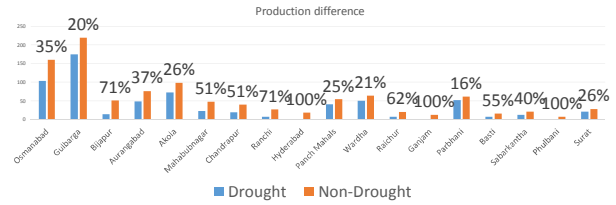
VARIABLES	PPEA_Total Area
PPEA_Total_area(t-1)	-0.262
	(0.161)
PPEA_Total_area(t-2)	-1.196***
	(0.349)
RICE_Total_area	0.0943
	(0.0833)
Cotton_Total_area	0.448
	(0.440)
RICE_Total_area_irrigated_share	-0.000359*
	(0.000196)
PPEA_Total_area-irrigated_share	-0.00245**
	(0.00108)
PPEA_Total_area-irrigated_share(t-1)	0.000775*
	(0.000439)
PPEA_Total_area-irrigated_share(t-2)	-0.00396**
	(0.00175)
Nitrogen_fert_total_cost	-0.0004037**
	(0.000186)
Phophorus_fert_total_cost	0.000167
	(0.000153)
drought_low	1.477
	(1.939)
drought_medium	-5.164*
	(2.936)
drought_severe	-1.795
	(1.278)
Ln(PPEA_price)	-9.183
	(10.67)
Ln(PPEA_price)(t-1)	0.518
	(6.547)
Ln(PPEA_price)(t-2)	2.636
	(5.512)
Ln(cotton_price)	5.071
	(6.528)
Ln(Rice_price)	2.147
	(4.543)
Net Irrigated area	-0.278**
	(0.136)
Insecticides_cost(Rs)	0.0108***
	(0.00203)

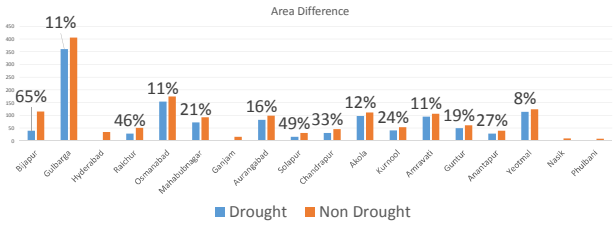
- Price factors do not account for supply response in terms of acreage response by the farmers even at the farm gate level.
- Non-price factors like rainfall(drought) is significant.
- There can be issue of risk premium precluding response to prices which means that the supply curve is piece-wise vertical.
- Beyond a threshold price change it is upward sloping.
- These results are robust to varying lag lengths.
- Net Irrigated Area in a district is significant and negative.

Dynamics of Pulses

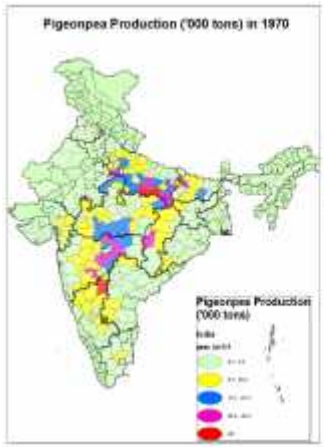
- Pulses have not increased much in area and yields over a long time but there have been allot of interregional movements
- Pulses have been crowded out by cereals.
- Pulses moved away from green revolution belt.
- Pulses also moved away from irrigated areas which is also shown by my regression as Net irrigated area was negative and significant
- 87% of current pulse production happens in rain fed areas.

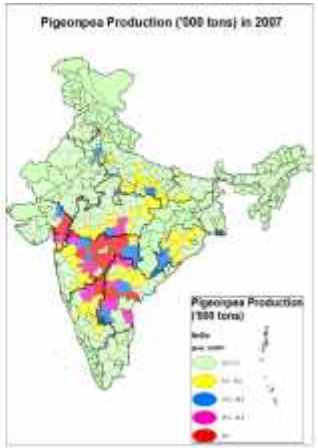
Descriptive Statistics (1)





Descriptive Statistics (2)





Conclusions and Way Forward

- Big Price increases needed to overcome the risk.
- Strengthening Evidence for Instruments like **Irrigation** as it is mostly grown in rain fed areas
- **Government Procurement** for pulses as this will hinder hoarding Practices by private players.
- Future Of MSP for pulses? Can MSP take care for Risk Premium? Are changes in MSP countercyclical?
- Price Policies can have limitations.
- Developing short duration varieties in Pigeon Pea to compete with cereals
- Take Soil conservation, drainage, agronomic measures to address flooding and drought problem in Pigeon Pea

1 Agricultural Statistics at a Glance 2012, Government of India 2 data for year 2006 was deleted due to non availability of data in CACP data-set.

3 Robust standard errors in parentheses