

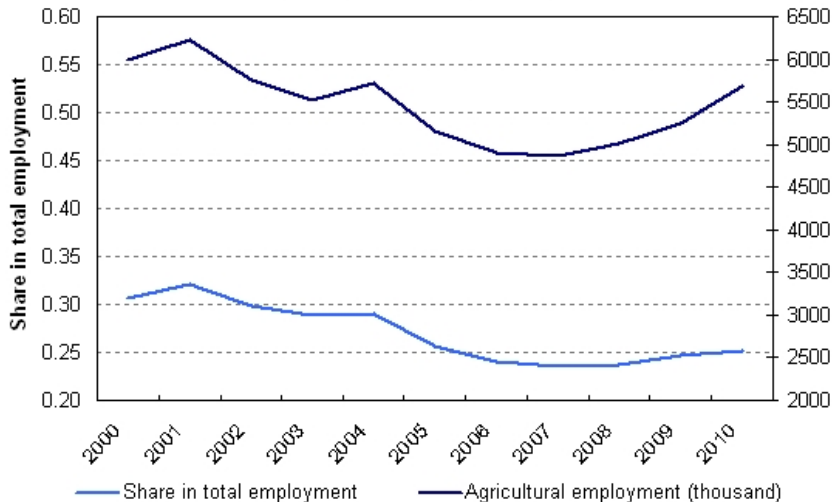
# Why is Agricultural Employment Increasing in Turkey?

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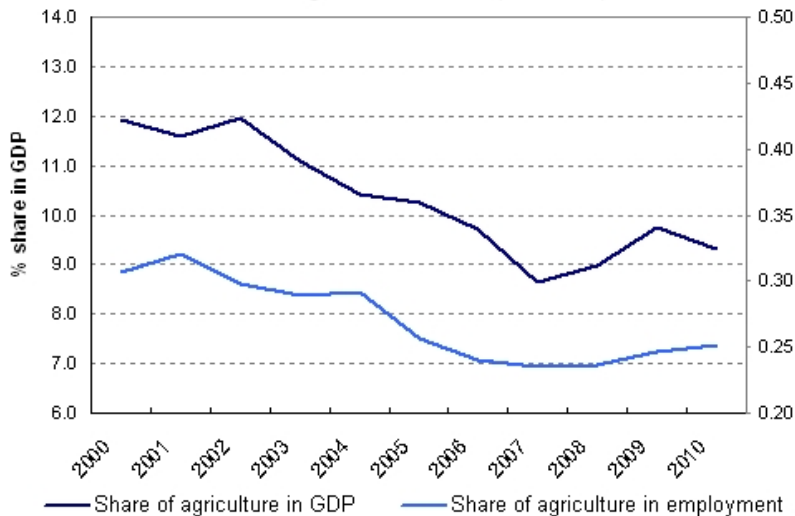
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December 9, 2011

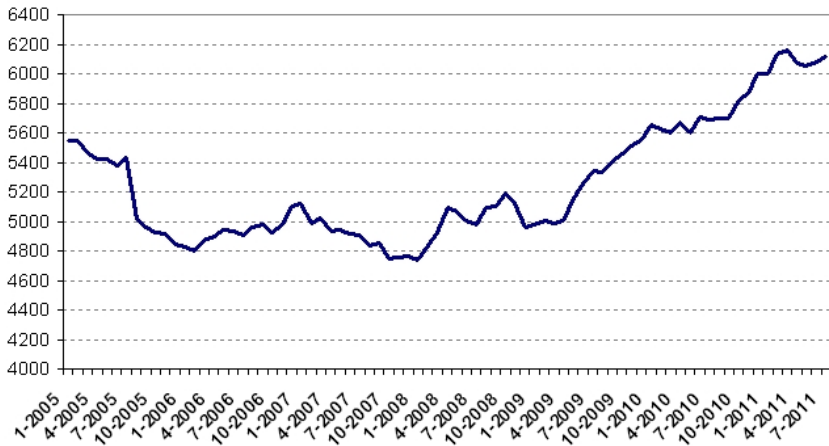
### Agricultural employment



### Share of Agriculture in GDP (1998-2010)



### Agricultural Employment (SA, thousand, monthly)



## Male in Agricultural Employment, by age



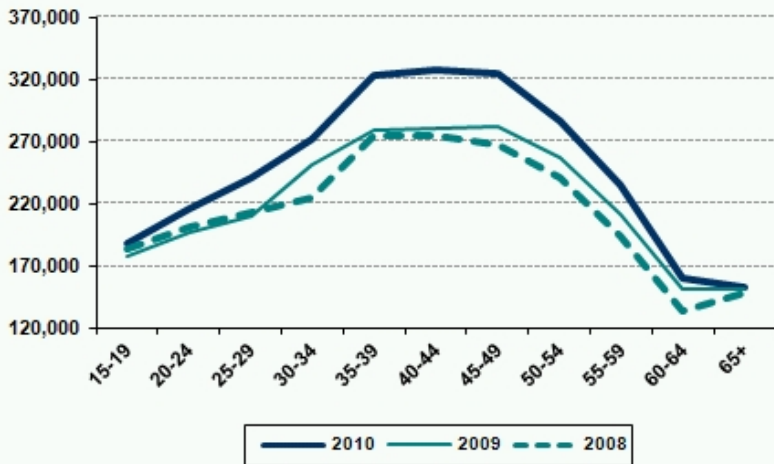
## Male in Agricultural Employment, by age



### Female in Agricultural Employment, by age



## Female in Agricultural Employment, by age





## Change in total agricultural employment

**Table:** Change in total agricultural employment per quarter by status  
(seasonally adjusted, difference in thousands)

	Regular & casual employee	Employer	Own account worker	Unpaid family worker
2007Q4-2009Q1	18	6	20	20
2009Q1-2011Q2	21	0	35	58

## Change in male agricultural employment

**Table:** Change in male agricultural employment per quarter by status  
(seasonally adjusted, difference in thousands)

	Regular & casual employee	Employer	Own account worker	Unpaid family worker
2007Q4-2009Q1	4	6	29	1
2009Q1-2011Q2	11	1	27	7

## Change in female agricultural employment

**Table:** Change in female agricultural employment per quarter by status  
(seasonally adjusted, difference in thousands)

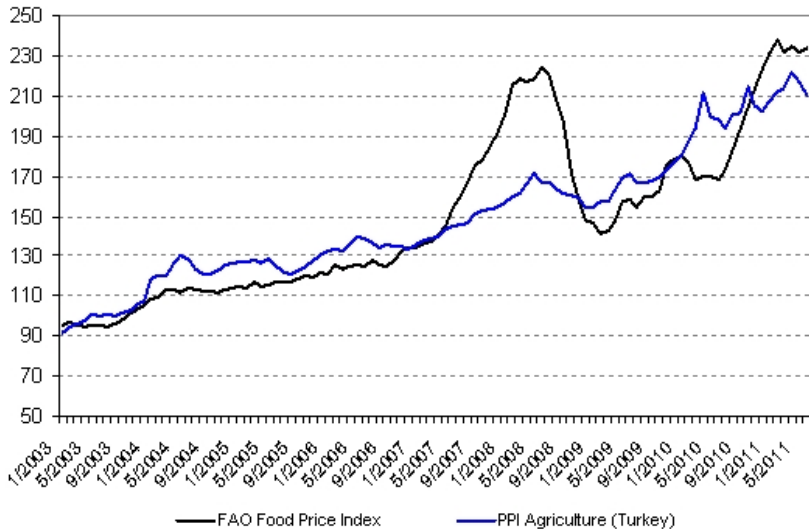
	Regular & casual employee	Employer	Own account worker	Unpaid family worker
2007Q4-2009Q1	14	0	-10	19
2009Q1-2011Q2	11	0	8	51

## Question

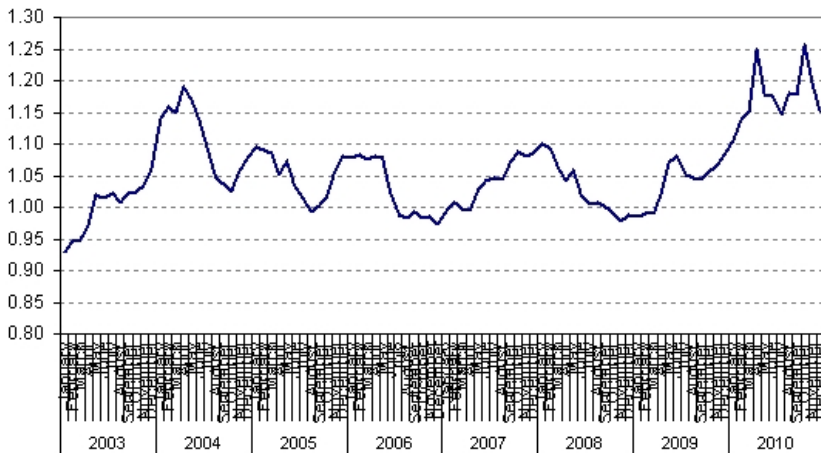
- Is the surge in agricultural employment stemming from a decrease in non-agricultural employment opportunities and wages during the crisis?
- Or, is the increasing global trend in food prices making the agricultural sector more attractive for employment?
- **Short answer:** Both effects matter.

However, in 2010 non-agricultural employment increased but real wages decreased slightly. This fact implies a greater role for agricultural prices during this year.

## World Food Price Index and Agricultural Price Index in Turkey



### Agricultural Price Index/Industry Price Index for Turkey



## Related Literature

- Labor pull into non-agricultural sector: Lewis (1954), Harris & Todaro (1970), Hansen & Prescott (2002)
- Labor push out of agriculture: Nurske (1953), Rostow (1960), Gollin, Parente & Rogerson (2002,2007), Ngai & Pissarides (2007)
- Both mechanisms: Matsuyama (1992, 2009), Alvarez-Cuadrado & Poshke (2009)
- Turkey: Çakmak (2004), İlkcaracan & Tunalı (2011), Şengül & Üngör (2011)

## Model

- An economy with two sectors: Agricultural and Non-Agricultural

$$Y_t^A = z_t^A F_A(l_t^A) \quad (1)$$

$$Y_t^{NA} = z_t^{NA} F_{NA}(1 - l_t^A). \quad (2)$$

where both technologies have decreasing returns in labor such that  $F'_A > 0$ ,  $F''_A < 0$  and  $F'_{NA} > 0$ ,  $F''_{NA} < 0$ .

- wages between the two sectors have to be equal in equilibrium

$$\frac{p_t^A}{p_t^{NA}} w_t^A = w_t^{NA} \quad (3)$$



- The relative price of agricultural goods is equal to the ratio of the marginal products of labor in the two sectors

$$\frac{p_t^A}{p_t^{NA}} = \frac{z_t^{NA} F'_{NA}(1 - l_t^A)}{z_t^A F'_A(l_t^A)} \quad (4)$$

- An exogenous shock to agricultural prices **pulls** labor into the agricultural sector.
- A decrease in non-agricultural productivity **pushes** labor out of the non-agricultural sector
- The two effects can trigger a **Reverse Migration** into the agricultural sector

## Testing for the Reverse Migration hypothesis: Exploiting the regional variation

- Has agricultural employment increased more in regions where agricultural prices increased more?
- Has agricultural employment increased more in regions where large declines in non-agricultural wages were observed?

The data (NUTS2, 26 regions)

- Agricultural Production and Price: Prices Received by Farmers (PRF) (survey), Crop Production Statistics (Ministry of Agricultural and Rural Affairs)
- Employment and non-agricultural wages: Household Labor Force Survey 2004-2010

## Regional Data: Agricultural Employment

Table: Average change in agricultural employment

	2005	2006	2007	2008	2009	2010
Mean change	-0.06	-0.01	0.01	0.04	0.03	0.19
St.dev.	0.18	0.27	0.14	0.22	0.15	0.31
Min	-0.45	-0.40	-0.22	-0.36	-0.24	-0.25
Max	0.37	0.31	0.30	0.42	0.44	0.60
Turkey (Aggregate)	-0.10	-0.05	-0.01	0.03	0.04	0.08

Source: TurkStat, Household Labor Force Survey

## Regional Data: Agricultural Prices

- Turkstat does not release regional price indices for producer prices but we have data on price of each agricultural product and regional production levels.

Example: Available data

- Average Price Received by Farmers (PRF) of cotton in Turkey
- Cotton production (in tons) for each region in Turkey  
A region with no cotton production will not be affected by the change in price and vice versa.
- We construct a basket of agricultural products for each region by averaging production share over the sample years (2004-2010) and measure the change in prices every year keeping the composition of the basket constant.

## Regional Data: Agricultural Prices

**Table:** Average change in regional prices and the PPI for agricultural products

	2005	2006	2007	2008	2009	2010
Mean change	0.05	0.05	0.12	0.11	-0.01	0.12
St.dev.	0.06	0.03	0.02	0.05	0.03	0.03
Min	-0.05	-0.01	0.07	0.02	-0.06	0.07
Max	0.19	0.12	0.16	0.20	0.04	0.18
PPI Agriculture	0.02	0.07	0.08	0.12	0.02	0.20
FAO Food Price Index	0.04	0.08	0.25	0.26	-0.21	0.18

Source: TurkStat, Food & Agricultural Organization of the UN (FAO)

## Regional Data: Non-agricultural wages

- HLFS data covers employment and wages for agricultural and non-agricultural sectors at NUTS2 level

### Measuring non-agricultural wages

- About 81% of workers in agriculture have less than 8 years of schooling
- We would like to estimate the effect on the workers who would potentially **reverse migrate** and/or choose to **remain** in agriculture.
- We use the average wage of paid-employees in the non-agricultural sector who has less than 8 years of schooling as our measure of the non-agricultural sector wage.

## Regional Data: Non-agricultural wages

Table: Average change in non-agricultural wages

	2005	2006	2007	2008	2009	2010
Mean change	0.14	0.11	0.11	0.12	0.07	0.07
St.dev.	0.06	0.04	0.03	0.03	0.05	0.03
Min	-0.02	0.02	0.03	0.04	-0.05	0.02
Max	0.24	0.17	0.17	0.18	0.22	0.13

Source: TurkStat, Household Labor Force Survey

## Panel Estimation

$$\Delta(Emp_A) = \beta_0 + \beta_1 \Delta(Price_A) + \beta_2 \Delta(Wage_{NA})$$

- Panel data with  $n=26$  regions and  $t=6$  years
- Price and wage changes are real (corrected for changes in regional CPI)



**Table:** Effect of change in agricultural prices on agricultural employment

	(1)	(2)	(3)
	Pooled OLS	Pooled OLS (Cluster)	SCC
Price	0.865*** (0.293)	0.865*** (0.293)	0.865** (0.334)
Constant	0.0228 (0.016)	0.0228* (0.013)	0.0228 (0.029)
Observations	156	156	156
$R^2$	0.054	0.054	0.054

Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$   
The dependent variable is the change in agricultural employment

**Table:** Effect of change in agricultural prices on agricultural employment

	(1)	(2)	(3)
	Pooled OLS (Cluster)	Fixed Effects	Random Effects
Price	0.865*** (0.293)	0.972*** (0.372)	0.924*** (0.340)
Constant	0.0228* (0.013)	0.0243 (0.017)	0.0236 (0.031)
Observations	156	156	156
$R^2$	0.054	0.037	
Adjusted $R^2$	0.047	0.030	

Standard errors in parentheses. \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$   
The dependent variable is the change in agricultural employment

## Conclusion

- Exogenous price increases in agricultural products are important in explaining the changes in agricultural employment.
- Changes in agricultural employment is also related to changes in wage or income earned in other sectors.