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Explaining heterogeneity in output prices:

Empirical evidence from Dutch horticulture

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Explaining heterogeneity in output prices: *Empirical evidence from Dutch horticulture*

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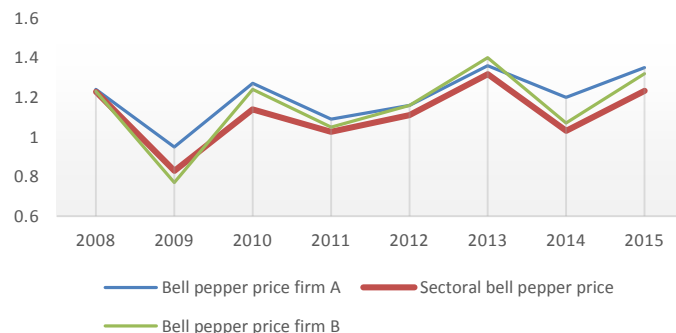
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Introduction and objective

Empirical micro-economic studies on firm performance traditionally focus on homogeneous goods and assume identical output prices. An underlying assumption is that firms are price-takers and hence have no ability to influence individual output prices. Recent developments in agricultural markets however question such an approach. After correcting for specific product-characteristics, we study the influence of firm characteristics on firm-specific output prices for the period 2008-2015 in Dutch horticulture.

Background

- Agricultural markets are characterized by high yearly price volatility, yet prices between producers in the same period might also vary considerably (see figure for an example in market for red bell pepper).



- Various sources of price dispersion:
 - Product differentiation (Wohlgemant, 2001), imperfect information (Sauer et al., 2012), transaction costs (Sexton, 2013), seasonality
 - Differences in firm structure in Dutch horticulture?
- Do these firm and product characteristics help to explain price dispersion? Are individual firms able to structurally differentiate from the average market price?

Methods and data

- By applying a modified Spence-Dixit-Stiglitz model we are able to model a market in which consumers not only value quantity, but also the quality-aspects of production, leading to a composite price \bar{p}
- This composite market price is a function of both quality-aspects (Λ), firm-specific elements (S, B) and external market effects

$$\ln(p_{it}) = \alpha + \beta\Lambda_{it} + \varphi S_{it} + \vartheta B_{it} + \sum_{t=1}^8 \gamma_{it} * dyear_t + \varepsilon_i + \mu_{it}$$

- This enables us to assess the influence on output prices through various crop-specific RE panel regressions
- Analysis Tool Rabobank (ATR) holds track of financial performance of >300 Dutch horticultural firms (producers of cucumber, vine tomato, red bell pepper and phalaenopsis) for the period 2008-2015
- Detailed information on input costs regarding production process (expenses on energy, capital, plant material, marketing and labor inputs), combined with firm specific characteristics (size, growing light, organizational structure)

Results

	Cucumber price		Bell Pepper price		Vine Tomato price		Phalaenopsis price	
	(i)	(ii)	(i)	(ii)	(i)	(ii)	(i)	(ii)
Energy costs	.036 (.022)	.036 (.022)	.026 (.017)	.005** (.011)	-.018 (.021)	.029* (.016)	.025 (.018)	.020 (.016)
Labor costs	-.064 (.042)	.031 (.041)	.024 (.009)	.086*** (.025)	-.087*** (.031)	.007 (.023)	.012 (.016)	.054*** (.014)
Plant material	-.025 (.041)	.017 (.039)	.012 (.031)	.066*** (.021)	.034 (.055)	.044 (.042)	.010** (.004)	.019*** (.003)
Capital costs	.003 (.027)	-.001 (.025)	.069*** (.017)	.064*** (.011)	.007 (.032)	.086*** (.022)	-.004 (.010)	.002 (.009)
Marketing costs	.049* (.028)	.069** (.027)	.104*** (.023)	.092*** (.020)	.026 (.042)	.136*** (.030)	.022 (.017)	.055*** (.016)
Size (10Ha)	-	.110* (.064)	-	.011* (.007)	-	.025 (.017)	-	.017 (.028)
Growing light	-	.067 (.098)	-	.012 (.019)	-	.115*** (.030)	-	.047* (.025)
Intensity (10kg per m ²)	-	-.026*** (.004)	-	-.142*** (.013)	-	-.207*** (.009)	-	-.061*** (.012)
LLC	-	.026 (.024)	-	-.009 (.010)	-	.019 (.021)	-	.001 (.021)
Year Effects	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
Intercept	-1.43*** (.068)	-1.18*** (.085)	.02 (.046)	.33*** (.046)	-.35*** (.064)	.62*** (.067)	1.18*** (.085)	1.12*** (.079)
N	236	236	317	317	460	456	101	101
R ² within	0.796	0.816	0.699	0.821	0.541	0.681	0.337	0.286
R ² between	0.065	0.337	0.043	0.477	0.325	0.875	0.211	0.717
R ² overall	0.455	0.556	0.469	0.754	0.256	0.819	0.308	0.502

Note: *, ** and *** represent statistical significance at respectively the 10%, 5% and 1% level.

Results (continued)

- Significant influence of firm characteristics (e.g. firm size) on output prices of individual firms. Possibility of price mark-up or bargaining power by individual producers
- Cucumber (homogeneous product) shows a very limited influence of product characteristics, yet firm size does affect prices.
- Heterogeneous products (vine tomato, phalaenopsis) show influence of product characteristics on output prices, given the larger opportunities for product differentiation.
- Vegetable markets however largely determined by external year effects, yet firm characteristics can partly mitigate this external volatility (visible when regressing on coefficient of variation of output price)

Conclusions

- After correcting for product differences, firm characteristics influence output prices in Dutch horticultural markets. This implies individual firms can gain price mark-ups in the studied markets.
- Imperfect competition and market power in agriculture are most often studied from the perspective of retail and food processors (Sexton, 2013), yet **also** interesting from the perspective of primary producers
- Commonly argued that food supply chains are characterized by power imbalances, yet there still is a lack of understanding of the factors that affect the differences in bargaining power between primary producers

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