Ag & Food Market Fundamentals & Dynamics

Myanmar Agribusiness Master Class

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Australian Government

Australian Centre for International Agricultural Research

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Agriculture and Food Market Fundamentals

- Overview- defining key terms
  - Market
  - Market fundamentals
    - Supply and demand
  - Transaction costs
  - Market structure
  - Price transmission
  - Price elasticity

What is a “Market”

- Set of all actual & potential buyers and sellers of a product
  - Buyers share a particular need or want that can be satisfied through exchange with suppliers.
- Many types of markets:
  - Input markets
  - Labour markets
  - Commodity markets
  - Intermediate and wholesale markets
  - Retail markets, end-consumer markets (e.g. food product markets)

- *Markets interrelate with each other through the exchange process. This can occur on a local, national or even global scale*

Products

- ‘Anything that can be offered to a market for attention, acquisition, use or consumption that might satisfy a want or need.’ (p. 9, Kotler, et al.)
- Includes:
  - physical objects, services, persons, places, organisations and ideas.
- Satisfy consumers’ needs and wants
- Must be demand for product to have “value”
- Vehicles for “need satisfaction”
- Customer must “value”

Types of Markets

Along a market chain, each trader buys and sells at different prices.

Commodity Chain Channels	**Definition**
Farm gate/ Producer	Located at or near the farm or place of production. Usually, the location where a commodity is first exchanged.
Assembly	Where smaller quantities of a commodity, usually from different farmers and small scale traders, are accumulated or aggregated. Assembly markets facilitate marketing and the movement of commodities and reduce marketing costs. They also enable sellers of small surpluses from remote locations to reach distant buyers.
Wholesale	Usually, where traders sell to other traders. Volumes per transaction tend to be larger, e.g. multiple 50 kg bags and even metric tons.
Retail/ Consumer	Where commodities are largely sold to end users, especially consumers. Volumes per transaction tend to be smaller, e.g. by kg or small bowl.

Source: FEWs (2008) Market Analysis and Assessment. Lesson 1, p. 12. http://www.fews.net/sites/default/files/Market%20Assessment%20and%20Analysis%20Training%20Module.pdf

2 Components of Markets

- Demand-side: Consumers, Customers, Users of products and services etc.
  - Marketers refer to the demand side as "the market"
    - Utility and Value (marginal utility)
- Supply-side: Producers, traders, wholesalers, processors, retailers
  - Marketers refer to the supply side as "the industry"
    - Production function and Costs (marginal costs)

The Demand Side

- Various quantities of a commodity that an individual is willing and able to buy as the price of the commodity varies holding all other factors constant.
- The demand curve represents an inverse relationship between the price and the quantity demanded (Qd) of a good or service during some period of time.
- Based on:
  - Common sense and observation
  - Diminishing marginal utility
  - Substitution effect
    - consumers buy what's cheaper
  - Income effect
    - Assuming a fixed budget, "income" increases if prices fall

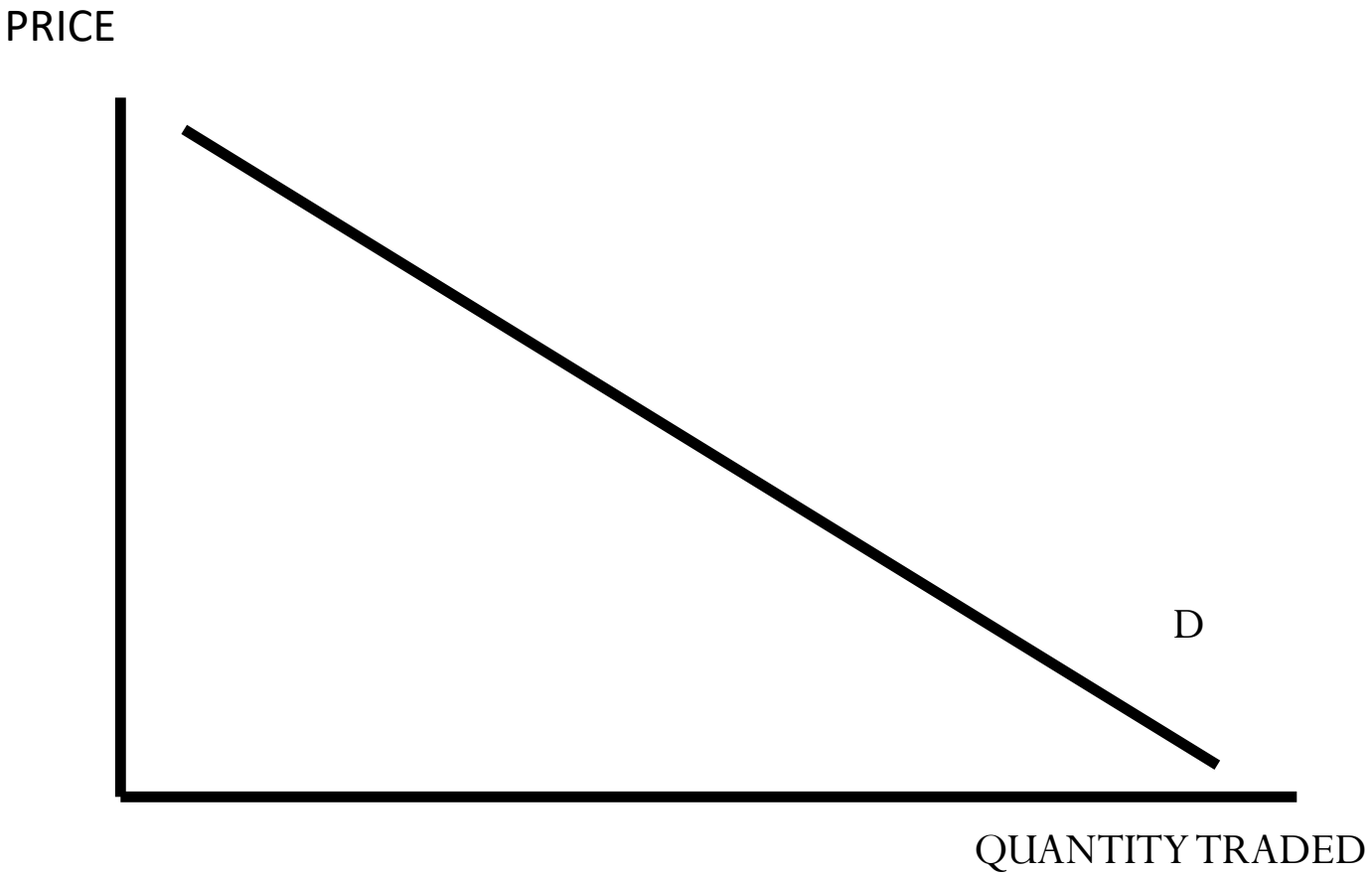
Demand = Customer value

- **Customer Value**

  The difference between the values the customer gains from owning and using a product and the costs of obtaining the product.

- Often times consumers perceive value differently than the product's actual monetary value.

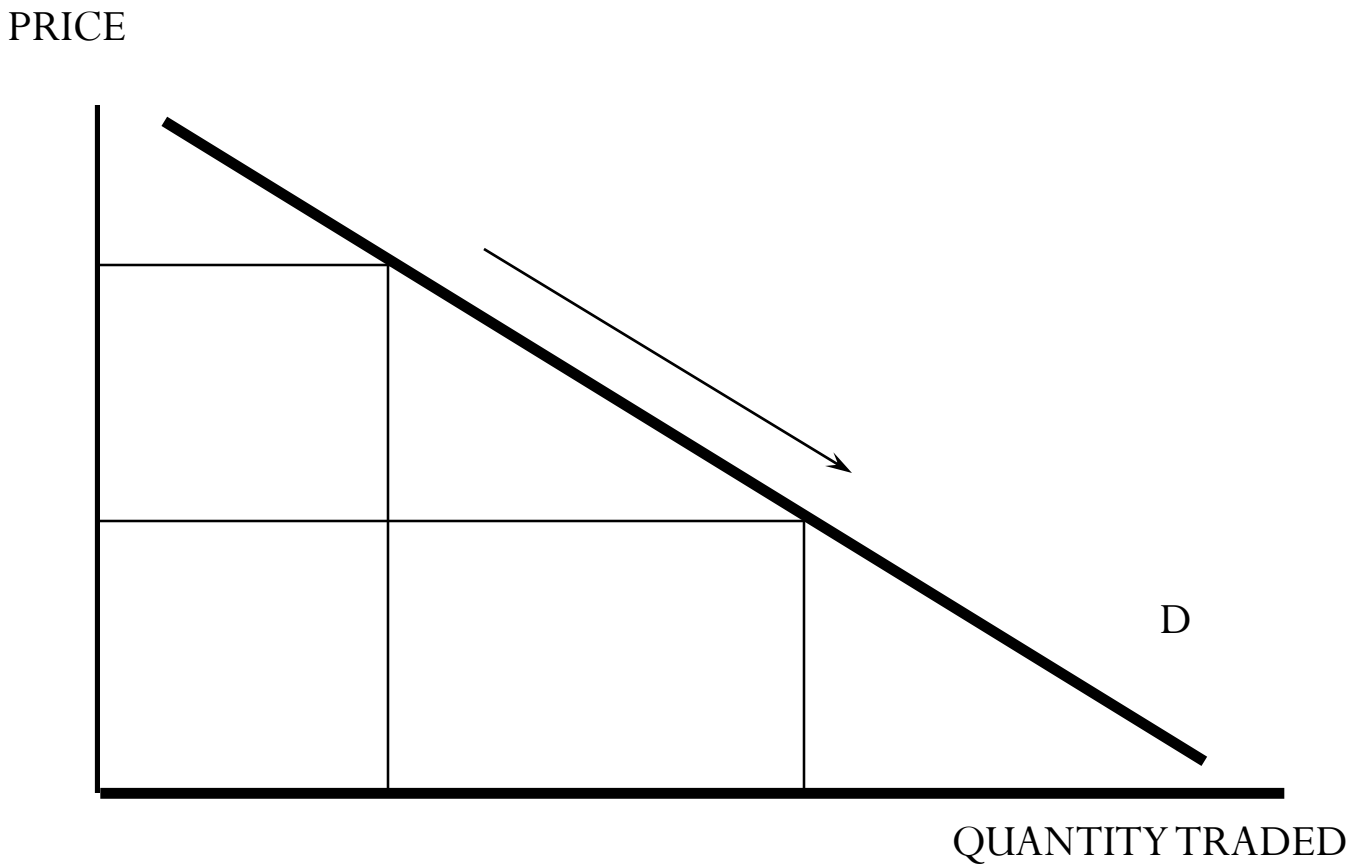
Demand



Changes in Quantity Demanded

- Movements along the demand curve
- Caused by changes in PRICE
- Not change in Demand, but change in QUANTITY Demanded, holding all else constant

Movement along the demand curve.



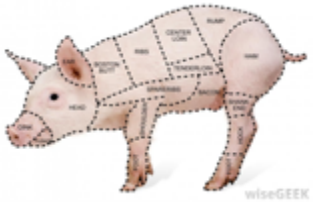
Retail Poultry Deflated Price and Consumption

$1.80
$1.70
$1.60
$1.50
$1.40
$1.30
$1.20
$1.10
$1.00
$0.90

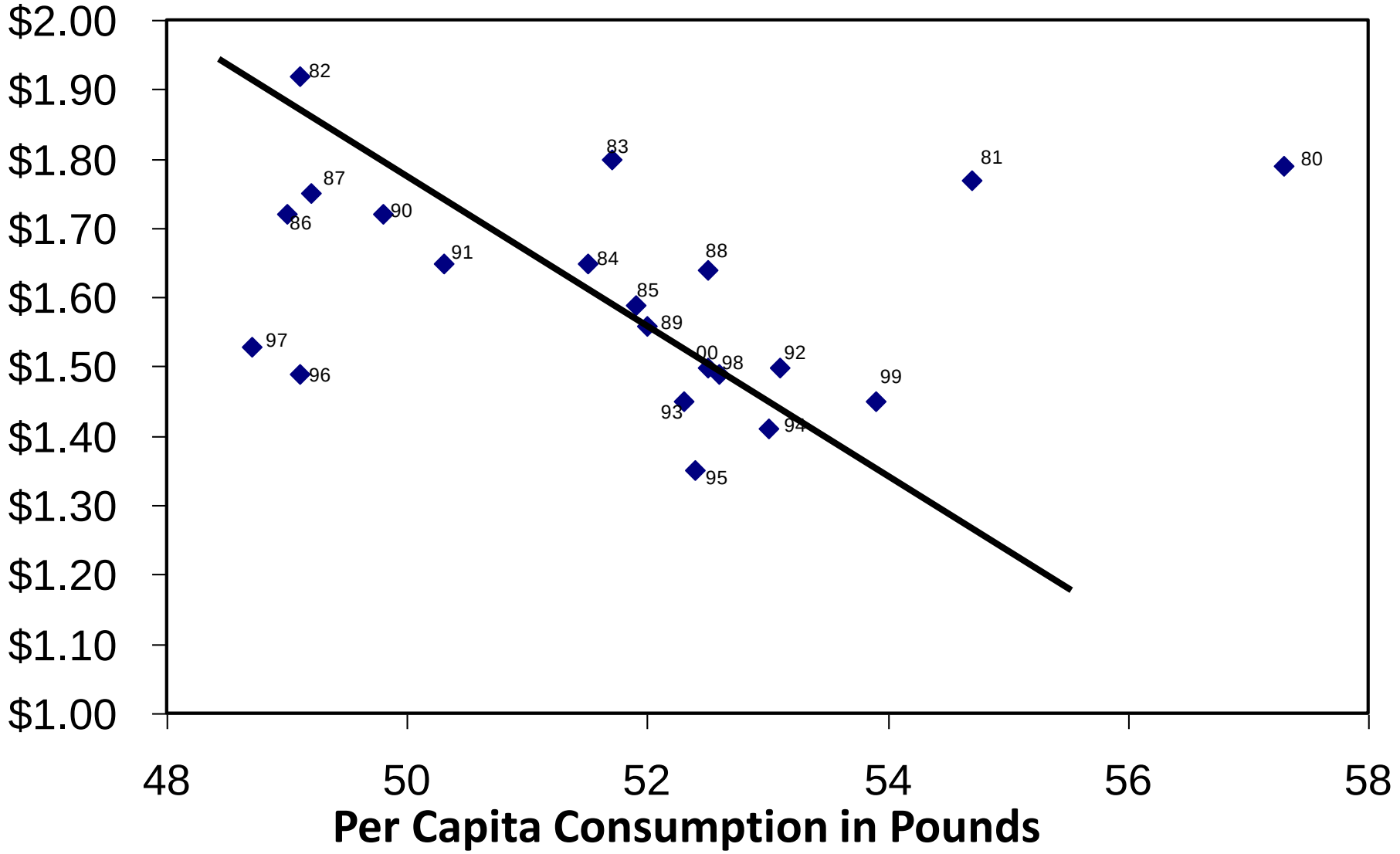
73 75 74 70 76 71 78 72 77 79 80 84 81 86 89 88 90 82 83 85 87 91 92 93 94 97 95 96 98

35 45 55 65 75

Per Capita Consumption in Pounds



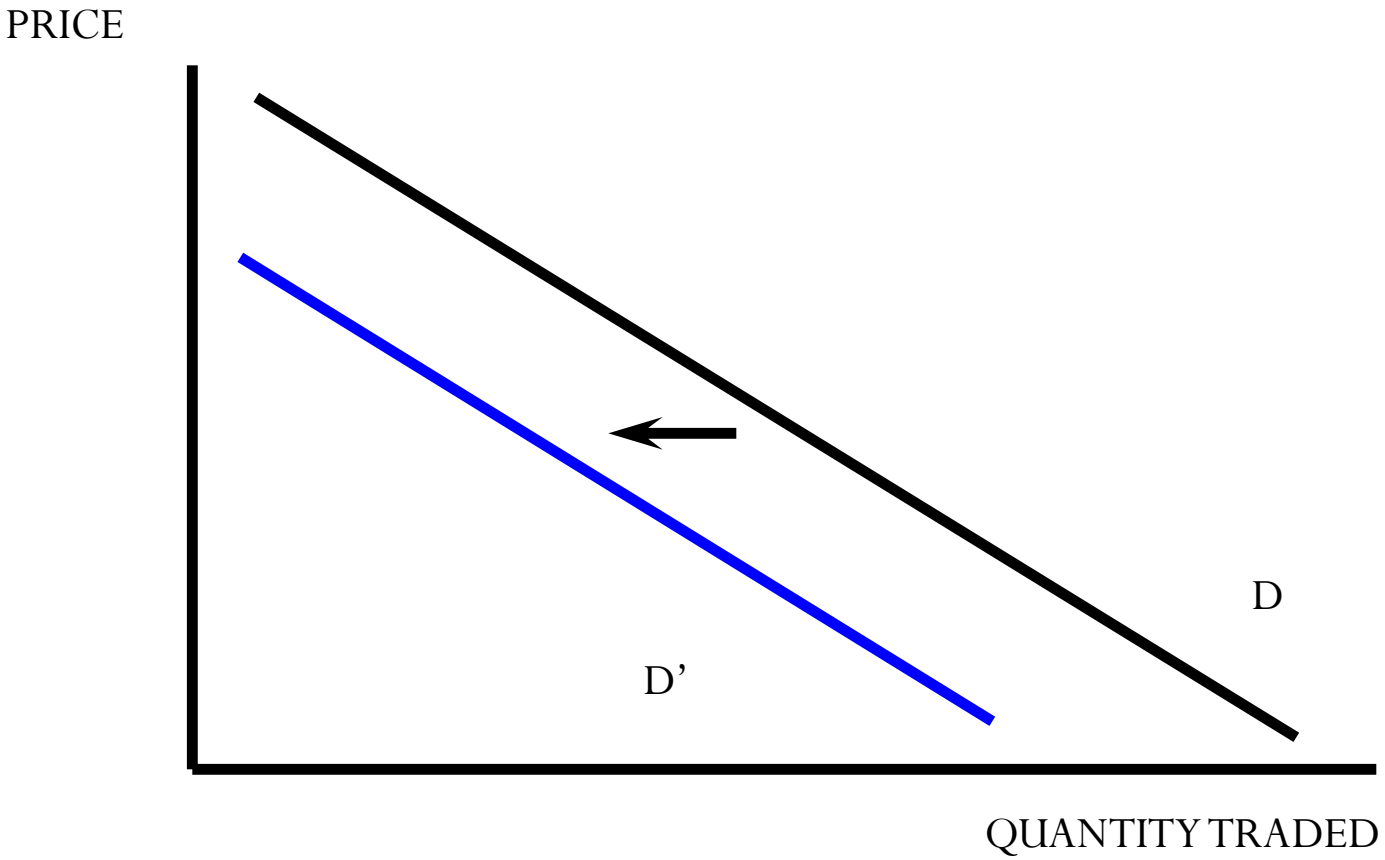
Pork Deflated Price and Consumption, Retail



What shifts the demand curve?

- Tastes and preferences
- Numbers of buyers (Population, International Trade)
- Income
  - Normal or superior goods - demand varies directly with income
  - Inferior goods - demand varies inversely with income
- Prices of related goods
  - Substitutes, complements
- Expectations and information (advertising, media)
- Policy (e.g. taxes, subsidies)
- Exchange rates (relative prices)

Decrease in demand



The Supply Side

- Other things being equal, the higher the price of a good, the *greater* is the quantity supplied of that good.
- Reason: increasing opportunity cost
- Two meanings of the supply curve
- Quantity sold at a given price
- Minimum price willing to accept for last unit sold of a given quantity
- Based off production function (resources available) and costs

Supply

PRICE

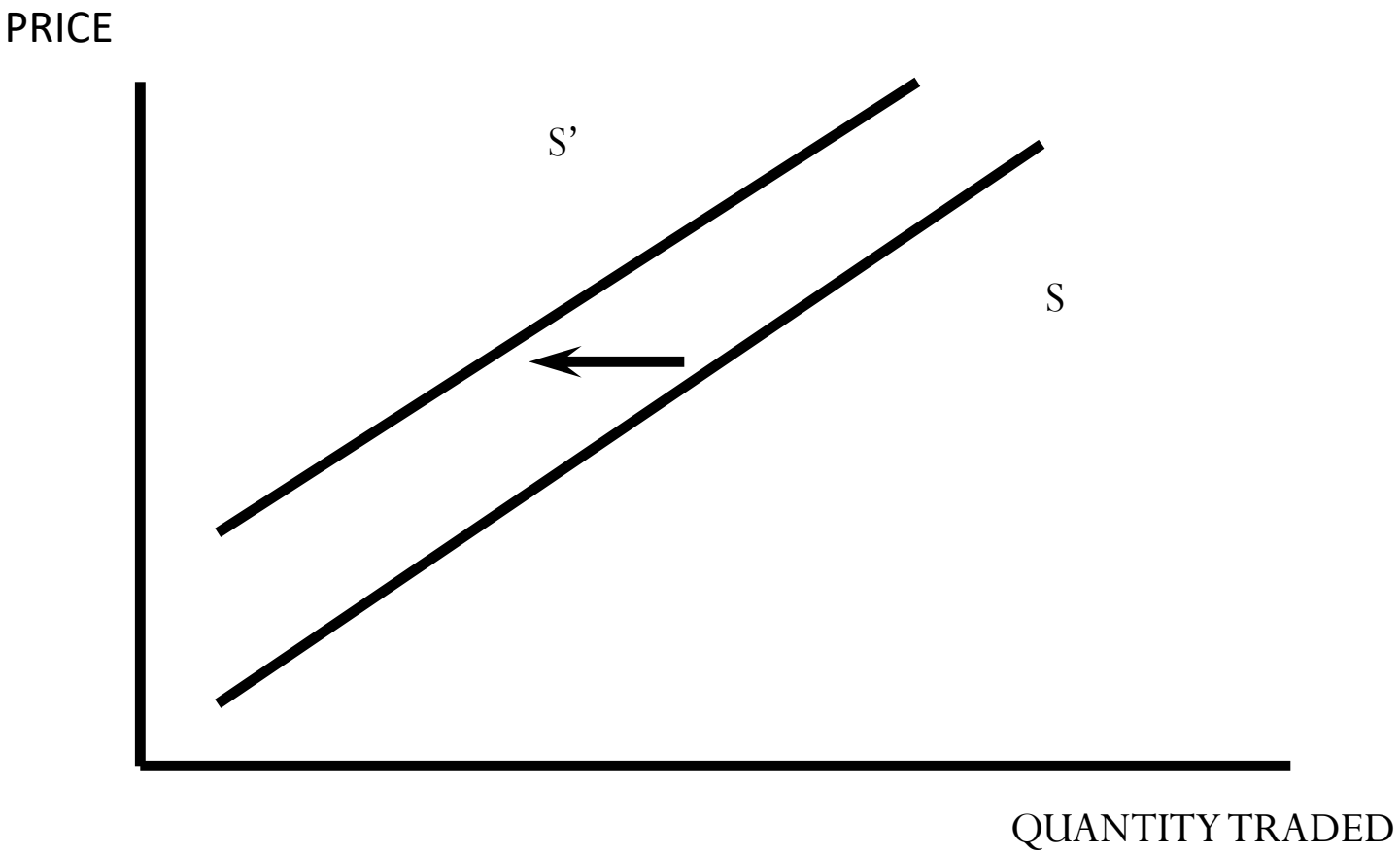
S

QUANTITY TRADED

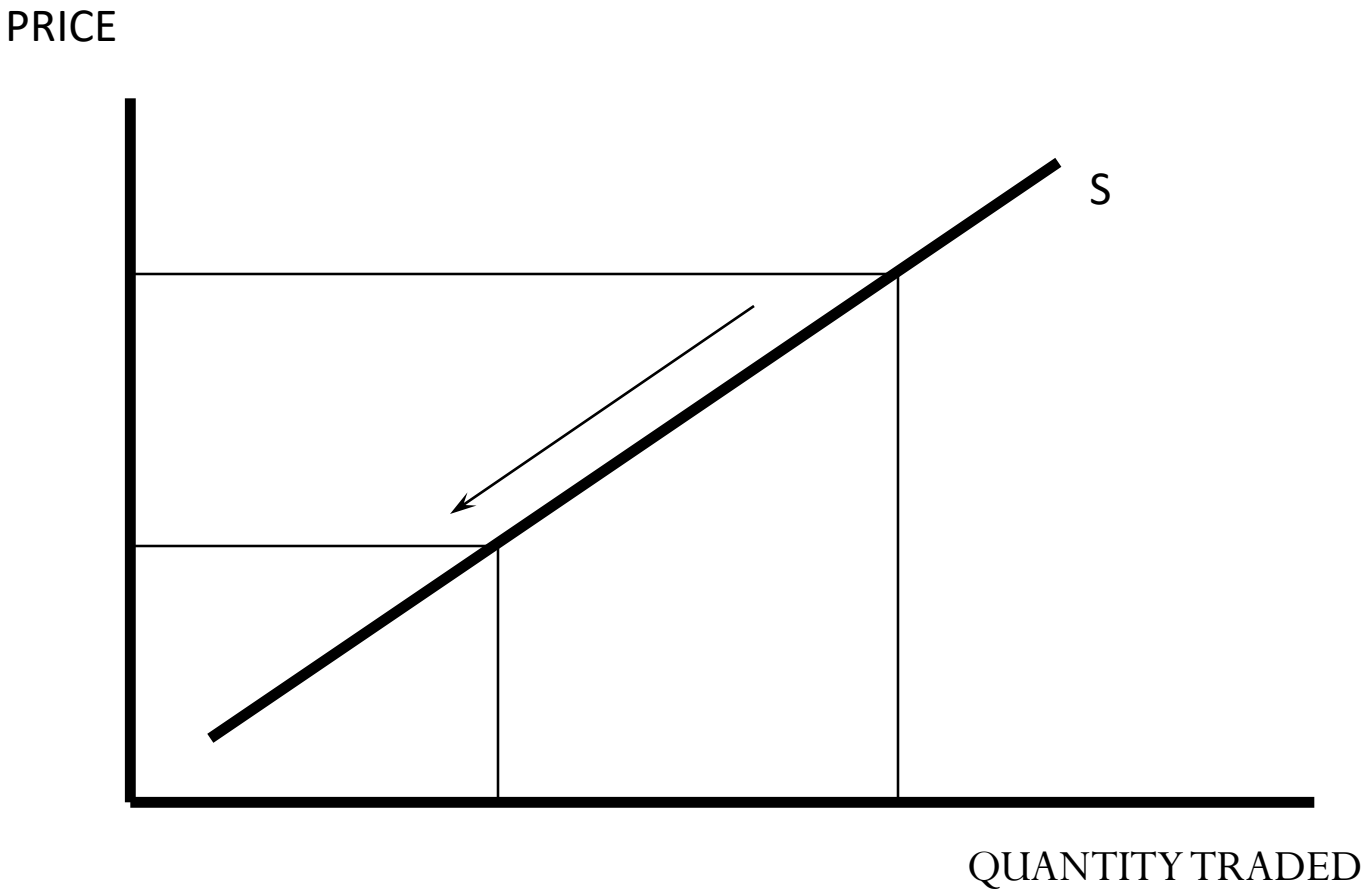
What shifts the supply curve?

- The prices of other goods
  - Substitutes in production
  - Complements in production
- Input Prices (capital, labour, etc)
- Expected future prices
- Number of suppliers
- Technology
- Weather
- Policy (subsidies, taxes)

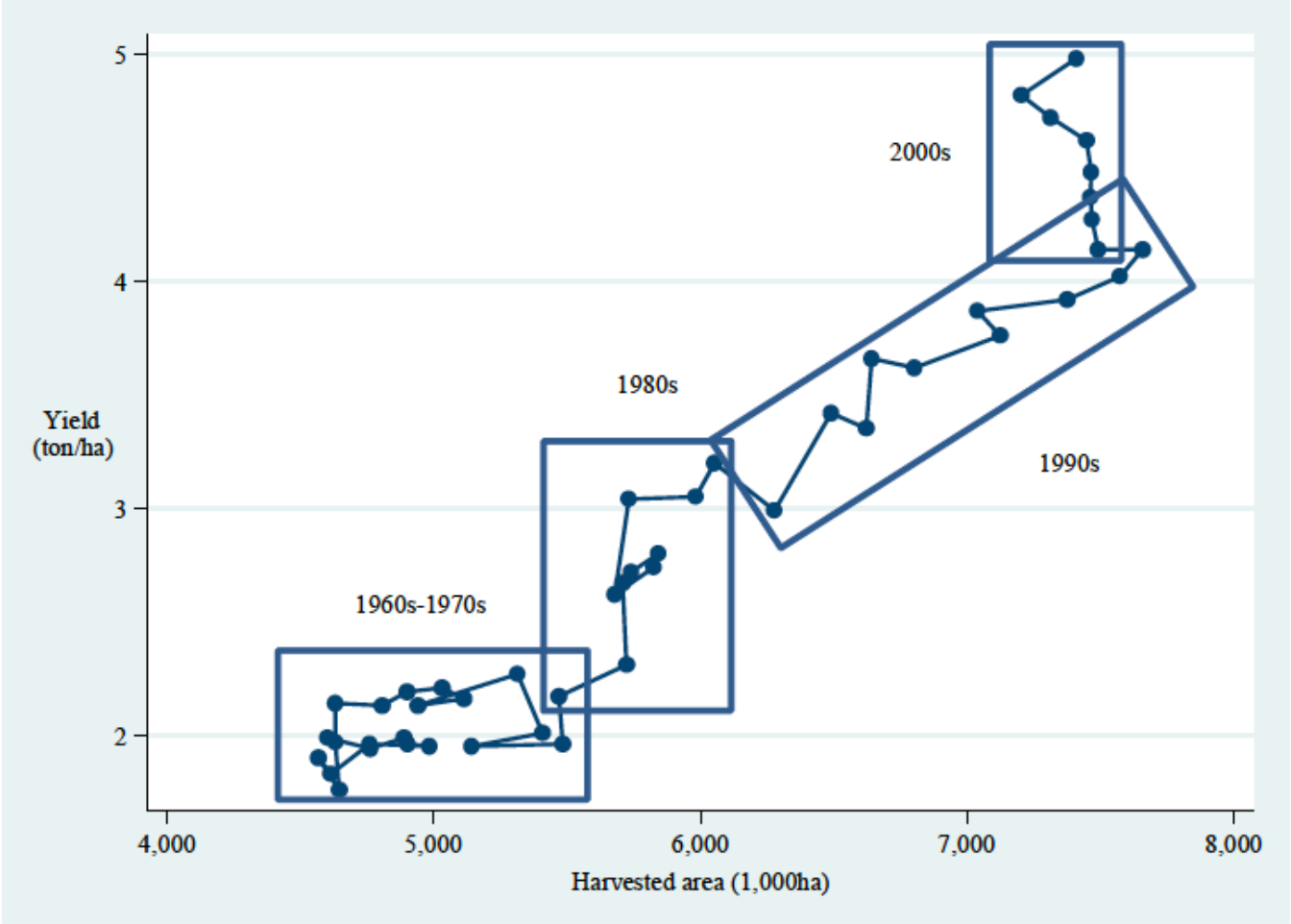
Decrease in supply



Movement along the supply curve.



Is this a supply curve?
Vietnam Rice Harvested Area vs Yield

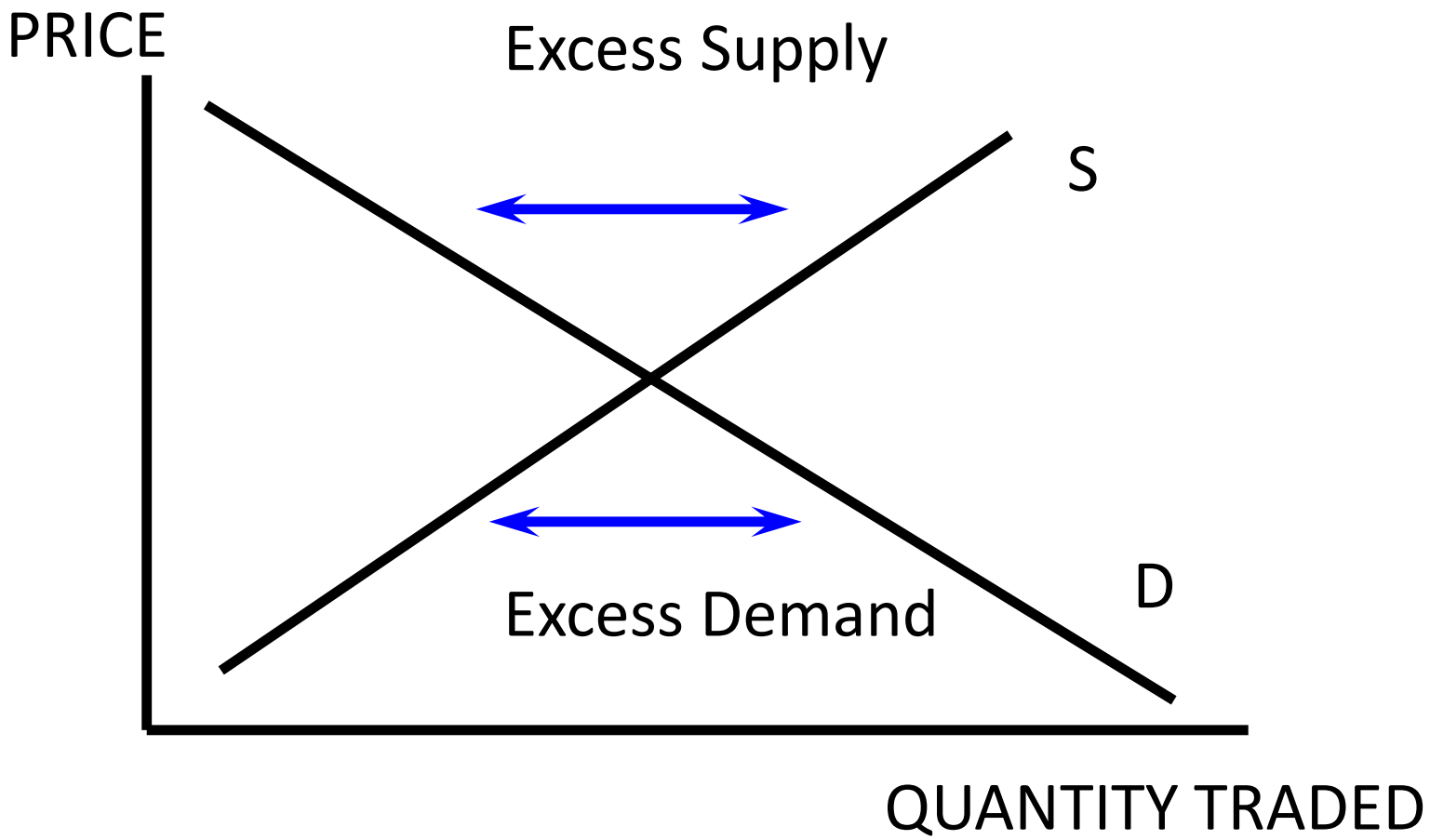


Source: United States Department of Agriculture (USDA), Foreign Agricultural Service, Production, Supply and Distribution Online, (http://www.fas.usda.gov/psdonline/psdhome.aspx) .

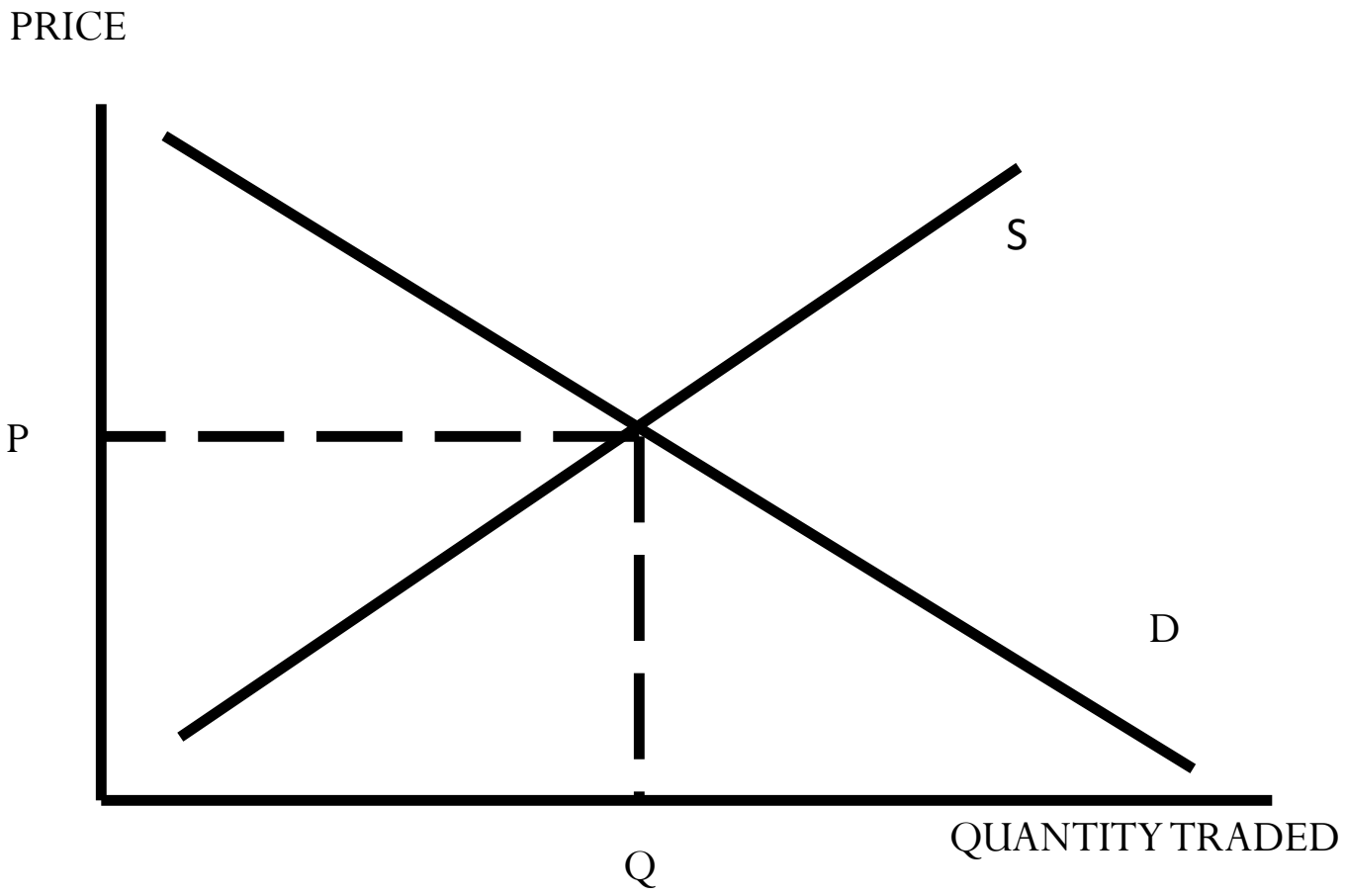
Figure 3-3 Harvested Area and Yield

Source: Tsukada, K. 2011. "Vietnam food security in a rice exporting country" Chapter 3. *The world food crisis and Strategies of Asian rice exporters.*

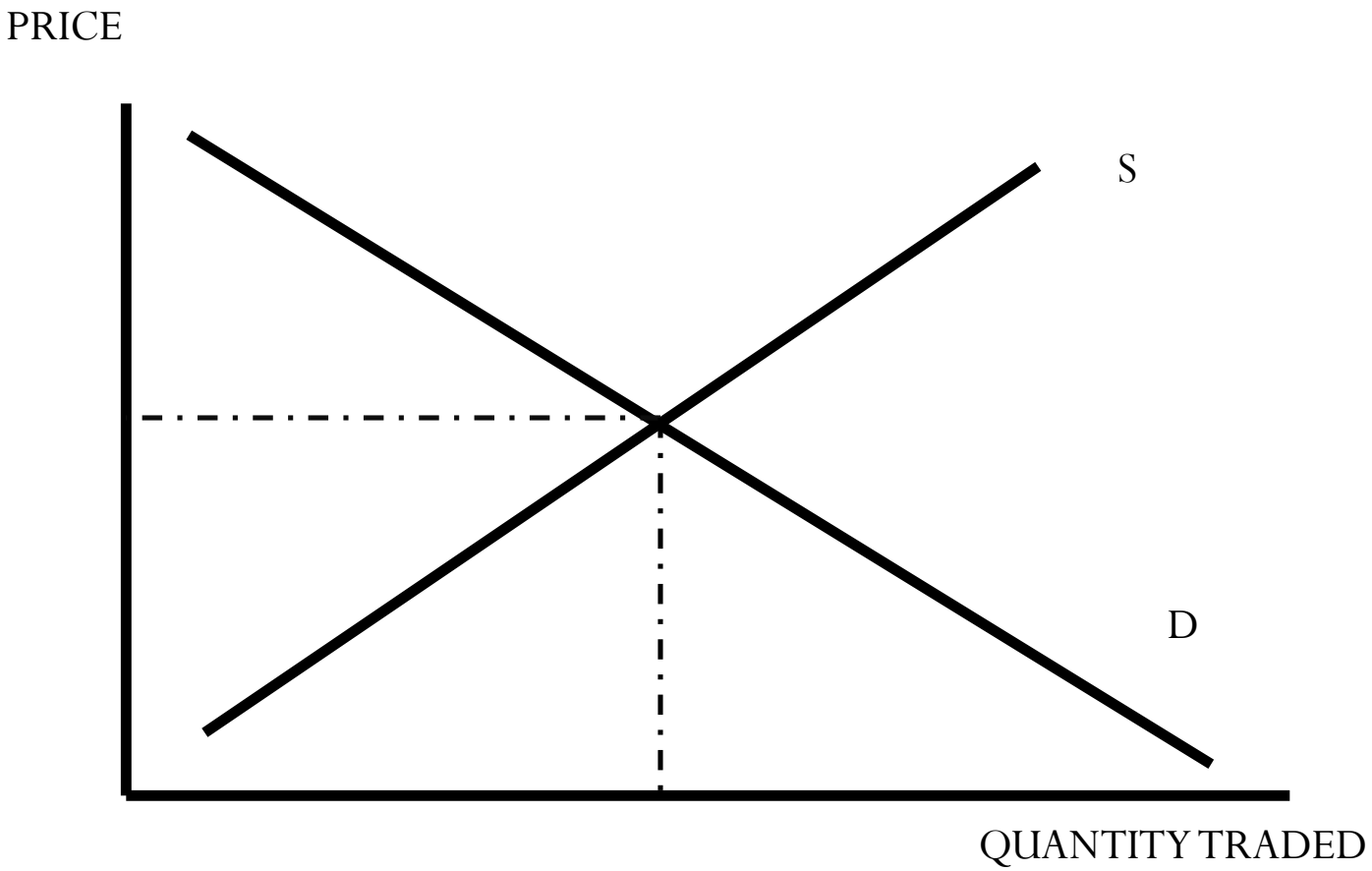
Equilibrium



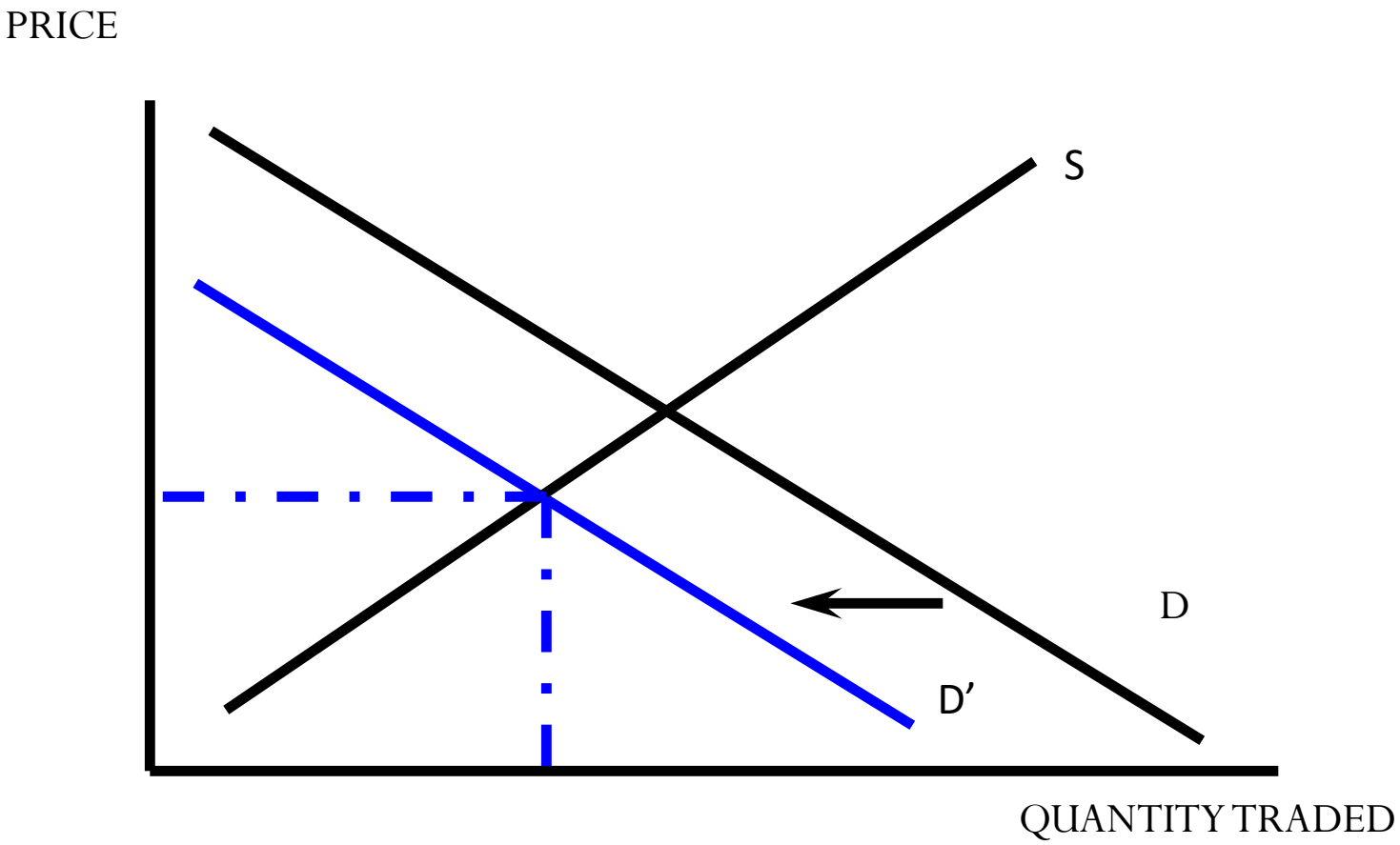
Equilibrium



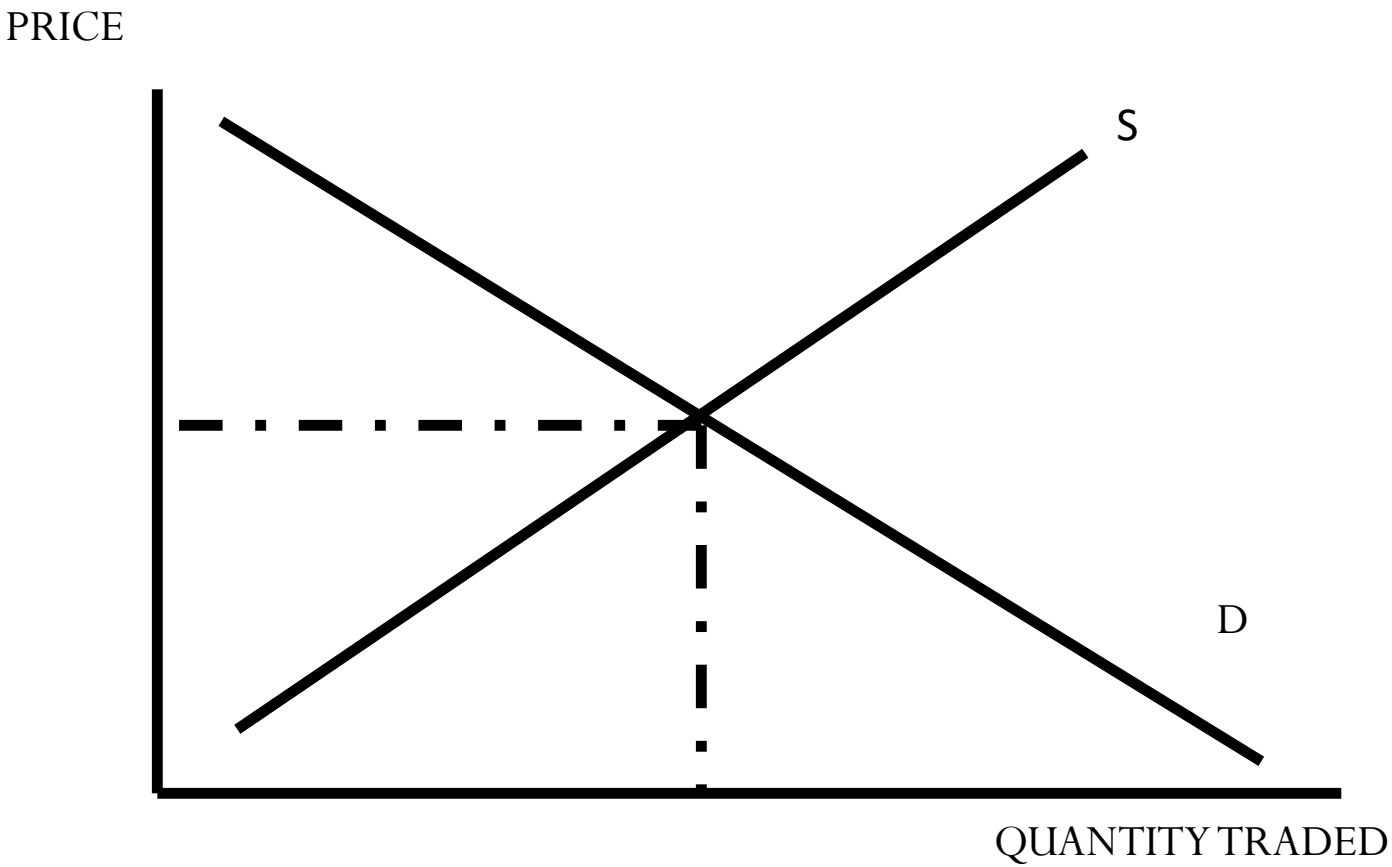
Change in demand



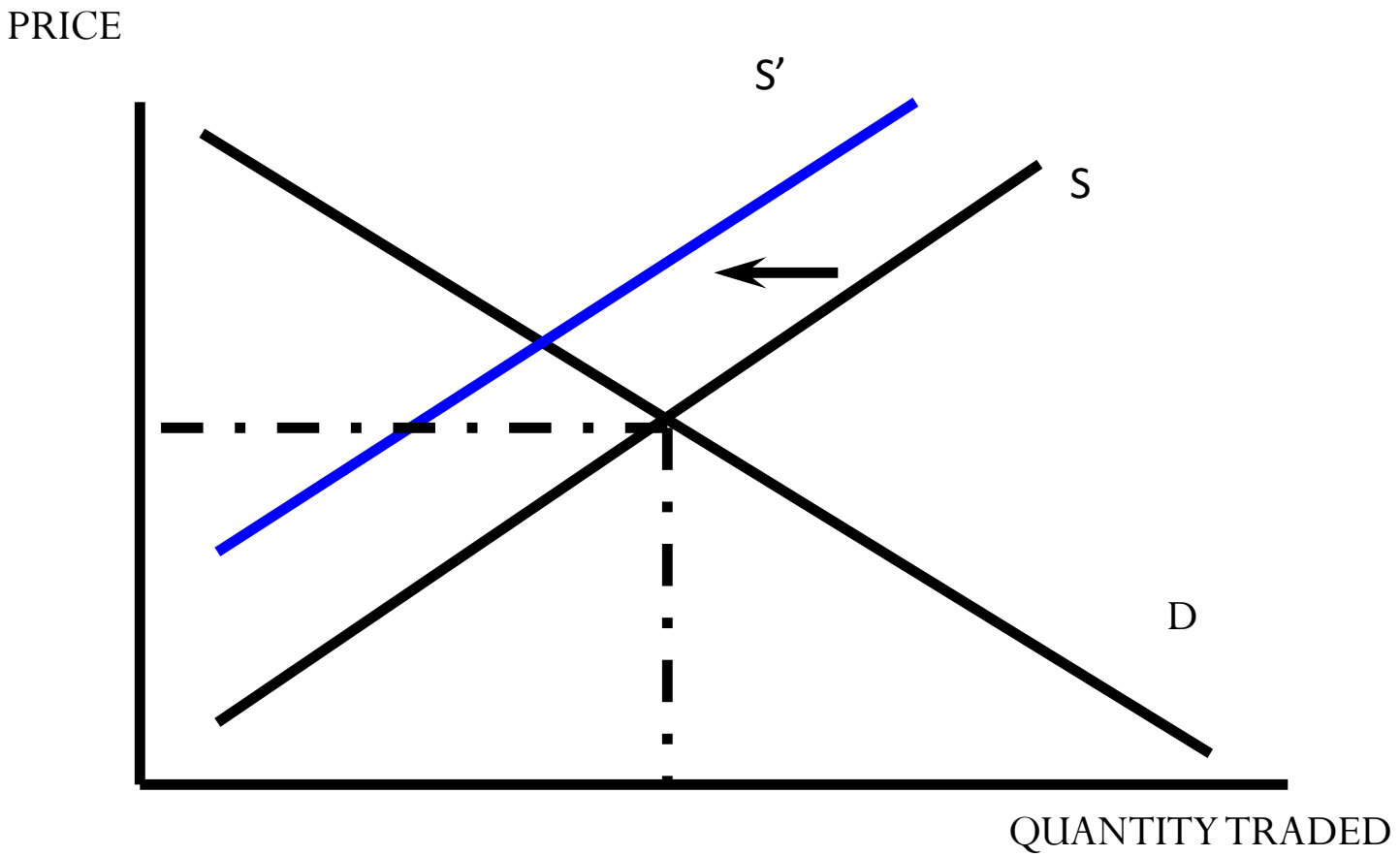
Change in demand.



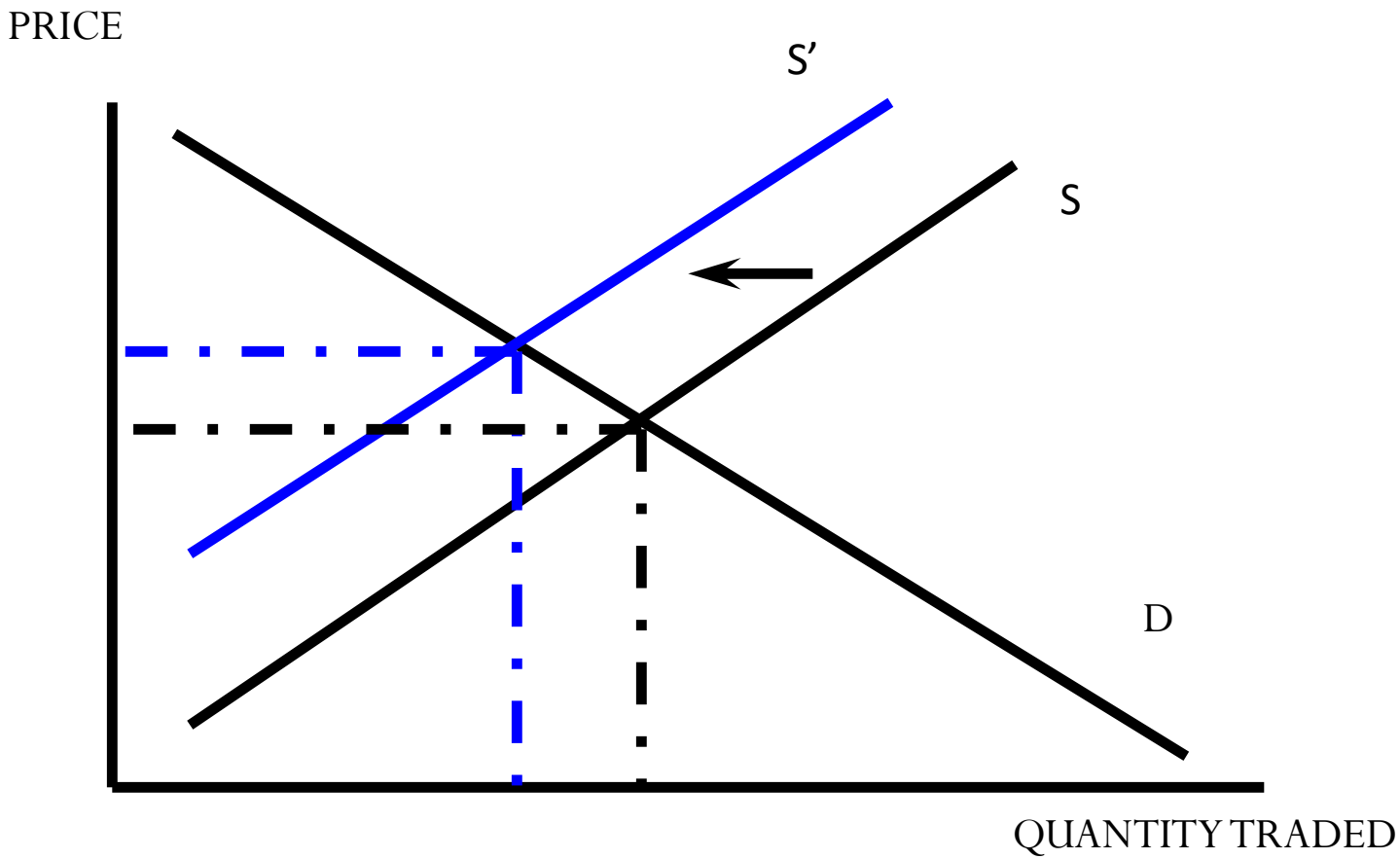
Change in supply.



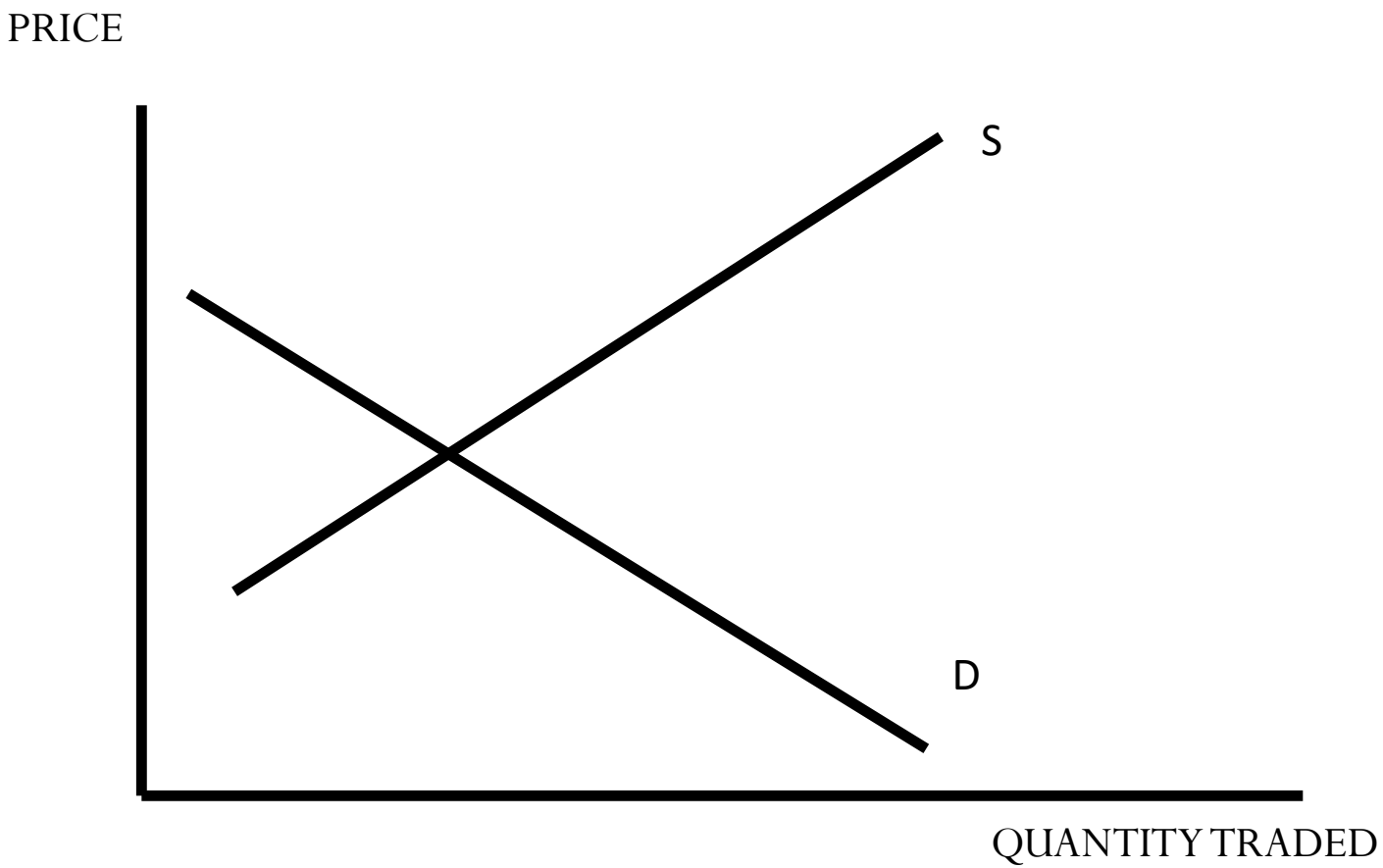
Change in supply



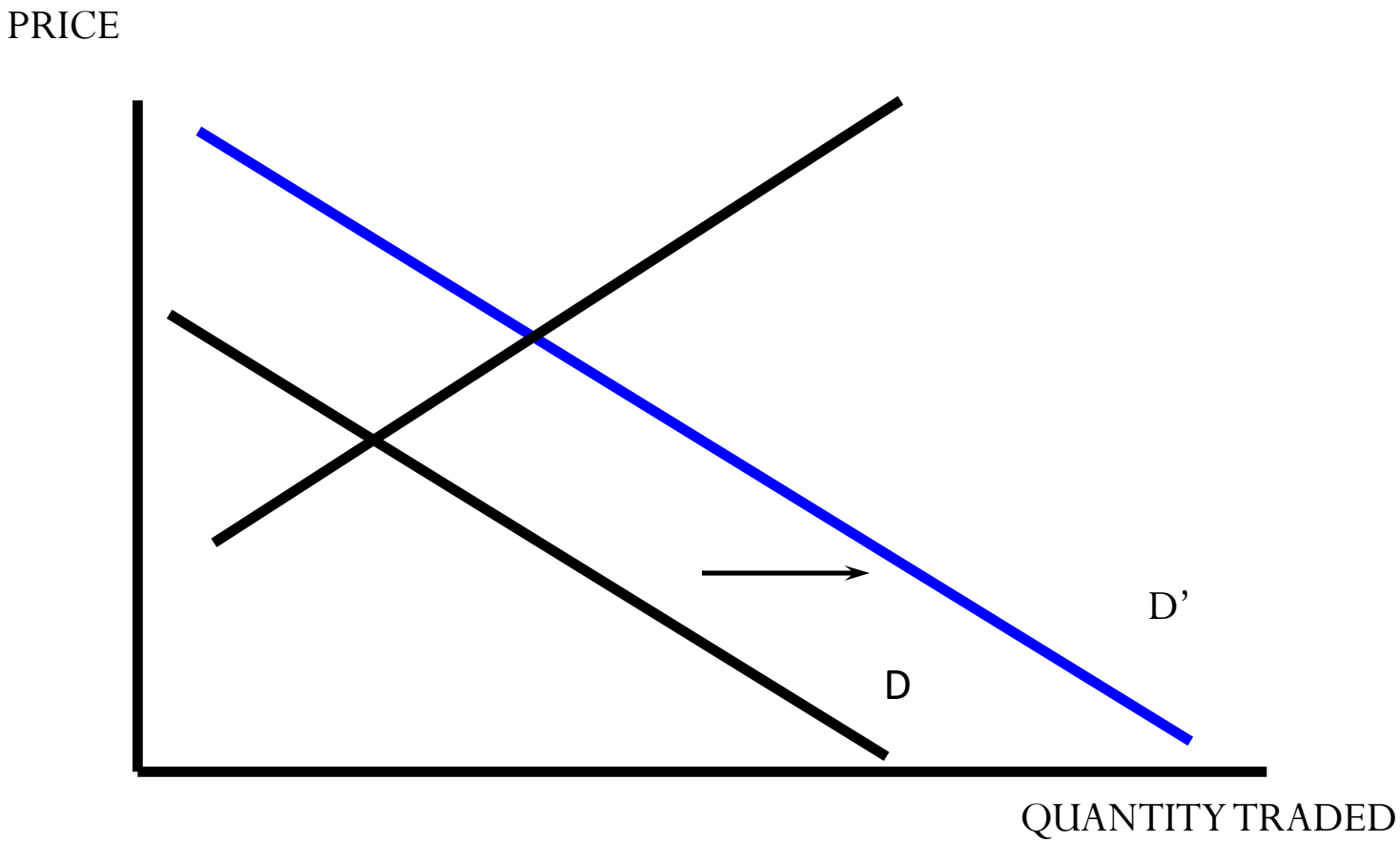
Change in supply



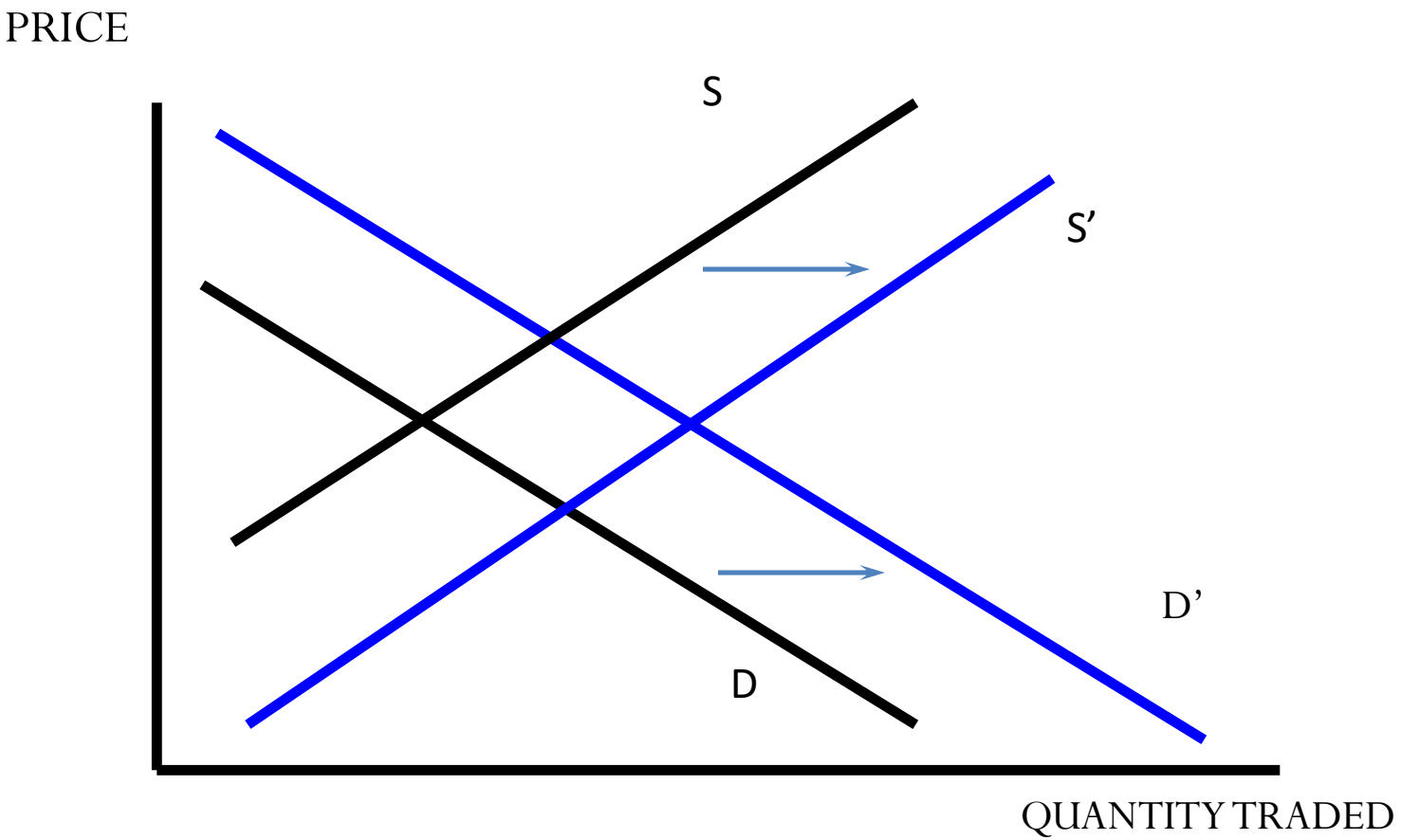
Change in demand and supply.



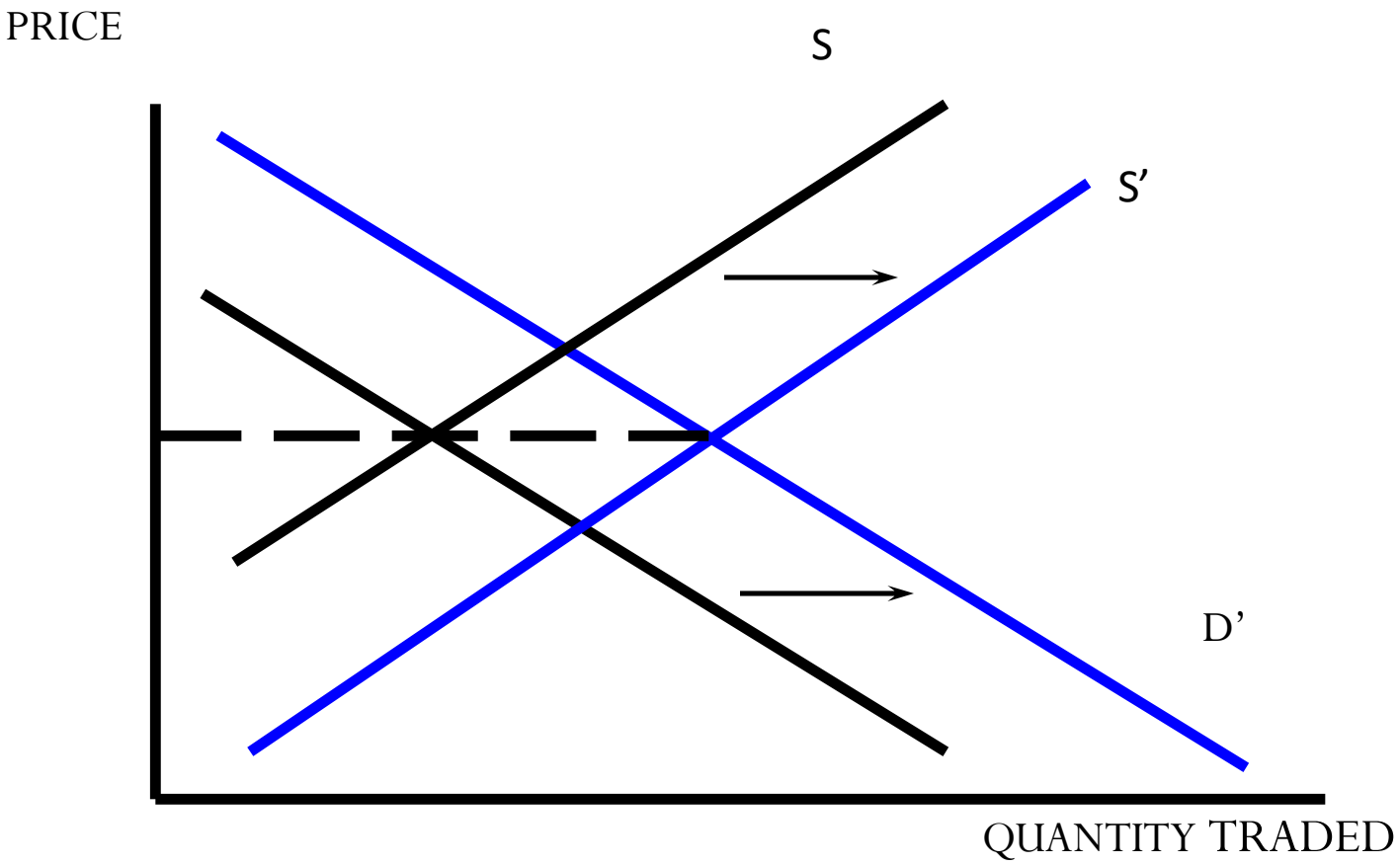
Change in demand and supply.



Change in supply and demand.



Change in demand and supply.

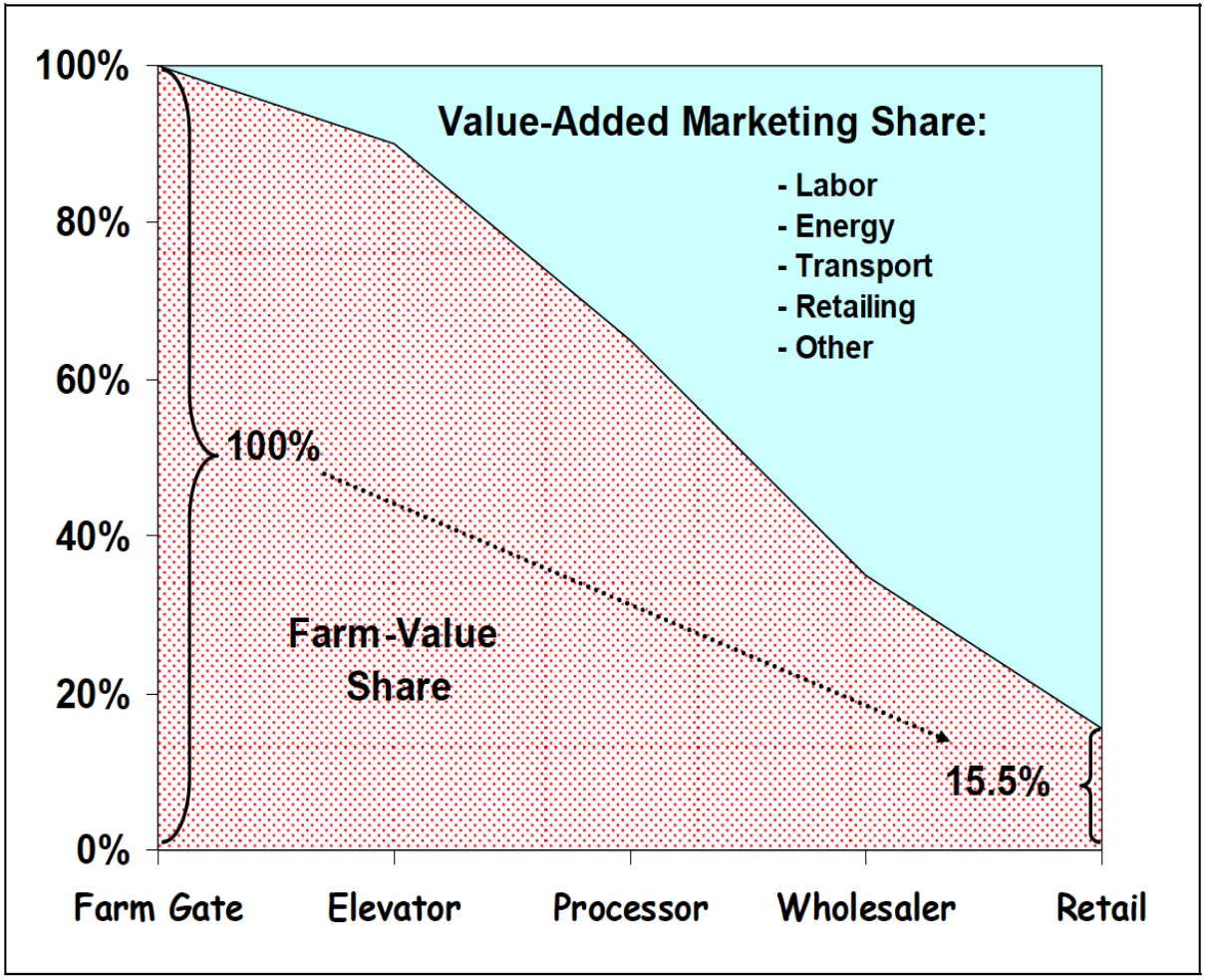


Other Determinants of Price

- Spatial
  - Place of sale (location / market)
- Type of product (commodity, niche)
- Product quality (e.g. grades) or perceptions of quality
- Packaging
- Time of sale
- Processing
- Perishability
- Market Structure and Conduct

Value added and Price

Figure 2. Value Added to Farm Products Along the Marketing Chain



Source: The retail share is for 2011 from ERS, Food Dollar Series, USDA, downloaded Sept. 20, 2013; at http://www.ers.usda.gov/data-products.aspx.. All other category shares are imputed by CRS.

Transaction costs

- In a food marketing setting, transaction costs are the whole array of costs associated with buying, selling, and transferring ownership of goods and services.
- The more transaction costs, the less **efficient** the market is…

Types of transaction cost	Source/origin of costs	Tangible forms of transaction costs
Search costs	Lack of knowledge about opportunities (eg products, prices, demand, supply, trading rights, market outlets)	Personal/personnel time Travel expenses Communication costs
Screening costs	Uncertainty about the reliability of potential suppliers/buyers Uncertainty about the actual quality of goods/services offered	Consulting service fees Advertising/promotion costs
Bargaining costs	Conflicting objectives and interests of transacting parties Uncertainty about willingness of others to trade on certain terms Uncertainty over transactor rights and obligations	Costs of credit rating checks Licensing fees Insurance premiums
Transfer costs	Legal, extra-legal or physical constraints on the movement/transfer of goods	Handling/storage costs transport costs bribery and corruption expenses
Monitoring costs	Uncertainty about transactor compliance with specified terms Uncertainty about possible changes in the quality of goods and services	Auditing fees product inspection charges Investments in measurement devices
Enforcement costs	Uncertainty about the level of damages/injury to a transacting party arising from contractual non-compliance Problems in exacting penalties through bilateral arrangements or through use of third parties	Arbitration, legal, court fees Costs to bring social pressures

Market Characteristics and Efficiency

- A market is said to be **functioning well** when goods flow into the market in times of deficit and out in times of surplus, via private trading.

- Relative functioning of a market depends on:
  - Number, size, independence of buyers and sellers
  - Formation of prices
  - Availability of information on prices and costs
  - Ease of entry and exit
  - Reliability of contract enforcement
  - Integration across markets
  - Institutional framework (infrastructure, government policies, etc)

Market Structure

- Number of buyers and sellers
- Homogeneity
  - Type, variety, quality and end-use characteristics
- Number of close substitutes
  - More substitutes means buyers are more price sensitive
- Storability or perishability
- Transparency of price formation
  - Open auctions or contracting
- Ease of entry and exit (asset specificity)
- Ease of commodity transfer between buyers and sellers
  - More mobile means more spatial price differences
- Artificial restrictions on market
  - Government, policy, trade, collusion

Commodities and Price

- Commodity
  - Generic, little differentiation
  - Many competitors,
  - Supply driven
  - Marketing decisions are primarily related to timing and location

What does this mean for producer's ability to affect/influence price???

Policy Impacts on Prices

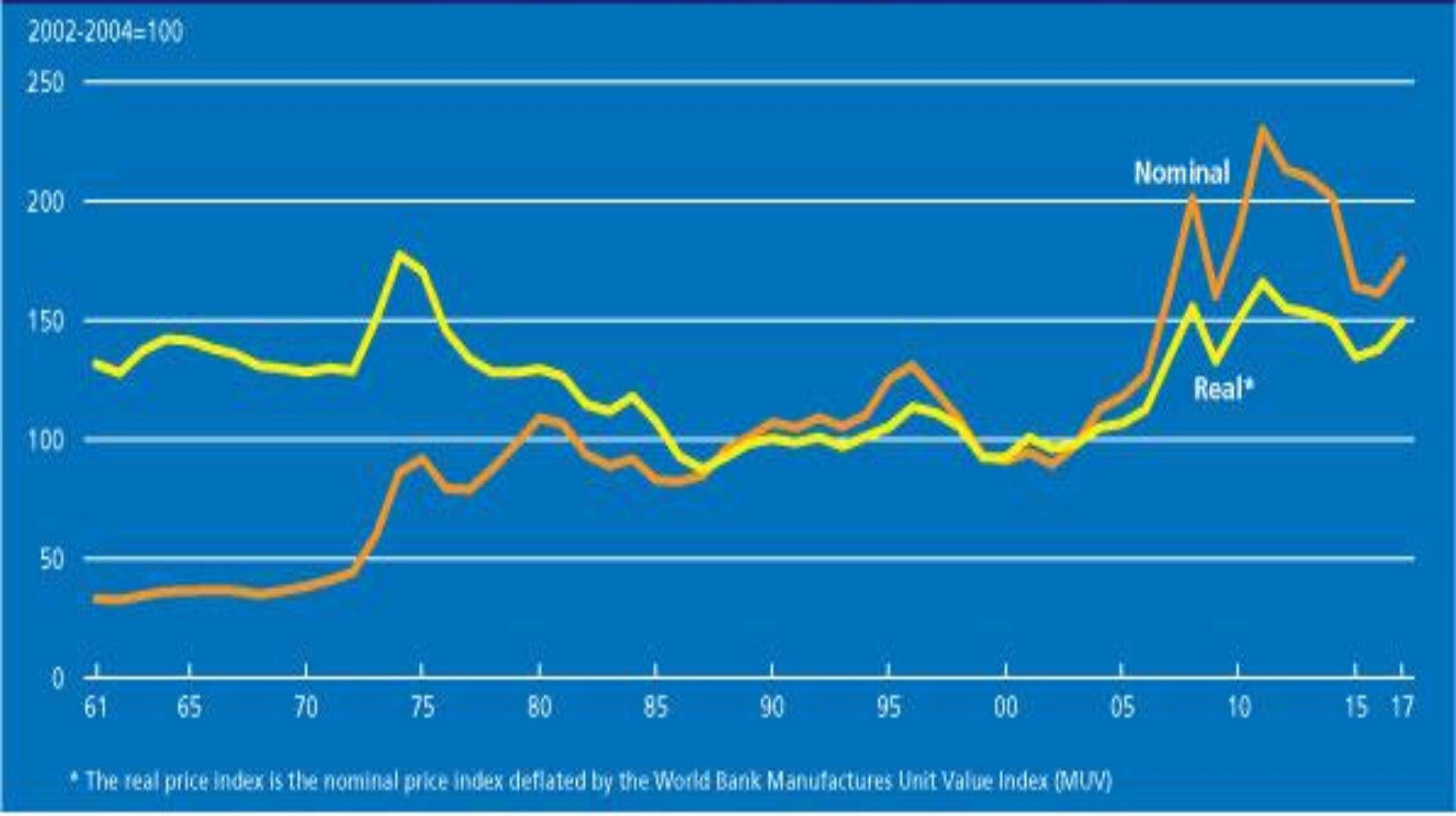
- Changing price
  - Subsidies
  - Price ceilings, floors
  - Taxes and tariffs
- Shifting supply and demand
  - Restrictions on imports
  - Restrictions on exports
  - Non-tariff barriers
  - Public stockholding and sales
  - Income transfers, food aid deliveries, LRP
- Exchange rates
- Interest rates

Ag and Food Market Time Series Data Usually has 4 Components

- Prices and Quantity (sales, quantity, production, stocks)
  1. Long-term trends
  2. Seasonal components
  3. Cyclical components
  4. Irregular or random components

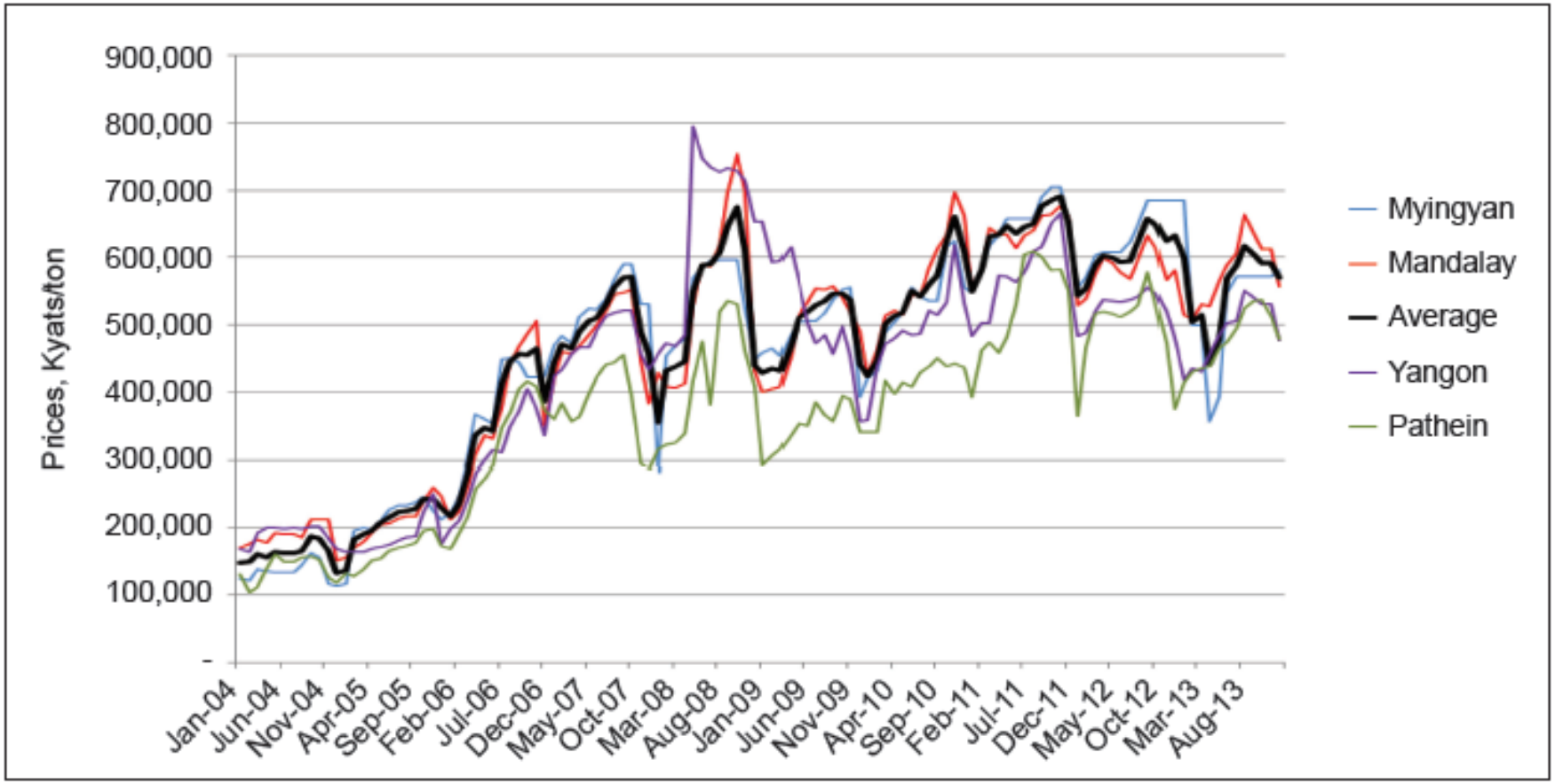
- Examined *individually*, the components can help us to determine the sources of variability and patterns of time series variables
- Must have “enough” data to see cyclical component

FAO Food Price Index in nominal and real terms



* The real price index is the nominal price index deflated by the World Bank Manufactures Unit Value Index (MUV)

Figure 1: Myanmar: Nominal prices of Pawsan, Kyats/ton



Source: MIS/MOAI (2014).

- Seasonality: Prices generally decline between December and February and peak between August and November.
- Long-term trend upwards in price,
- Quite variable during period- max price was 40% above minimum prices

Market Integration

- Markets are *spatially* integrated when price shocks from one geographic market are transmitted to other markets
- the supply of food adjusts spatially to meet demand
- In integrated markets, an increase in prices due to a large **local purchase** of food would signal traders to bring in more supply, or producers to produce more, bringing prices back down.
- If market integration is poor, supply doesn't flow, prices rise…
  - E.g. because of weak information, infrastructure, high transport and marketing costs

What is price transmission?

- Price transmission is when a change in one price causes another price to change
- Price transmission occurs between markets, between stages of a market channel, and between commodities… but not always

- 3 types of price transmission:
  1. Spatial: Price of cabbage in Lao Cai → price of cabbage in Hanoi
  2. Vertical: Price of wheat → price of flour
  3. Cross-commodity: Price of maize → price of rice

Source: Minot, N. 2010. AAMP Training materials "Module 3.2: Measuring Food Price Transmission" and "Transmission of world food price changes to markets in sub-Saharan Africa." Discussion Paper No. 1059. International Food Policy Research Institute, Washington, DC. http://www.ifpri.org/publication/transmission-world-food-price-changes-markets-sub-saharan-africa

Why is it important to examine and understand price transmission?

- Helps to understand causes of changes in prices, necessary to address root causes
  - Example: If little price transmission from world markets, then trade policy will not be effective in reducing volatility
- May help to forecast prices based on trends in related prices
  - Example: If changes in soybean prices transmitted to sunflower markets, then soybean futures markets may predict sunflower prices
- Helps to diagnose poorly functioning markets
  - Example: If two markets are close together, but show little price transmission, this may indicate problems with transportation network or monopolistic practices

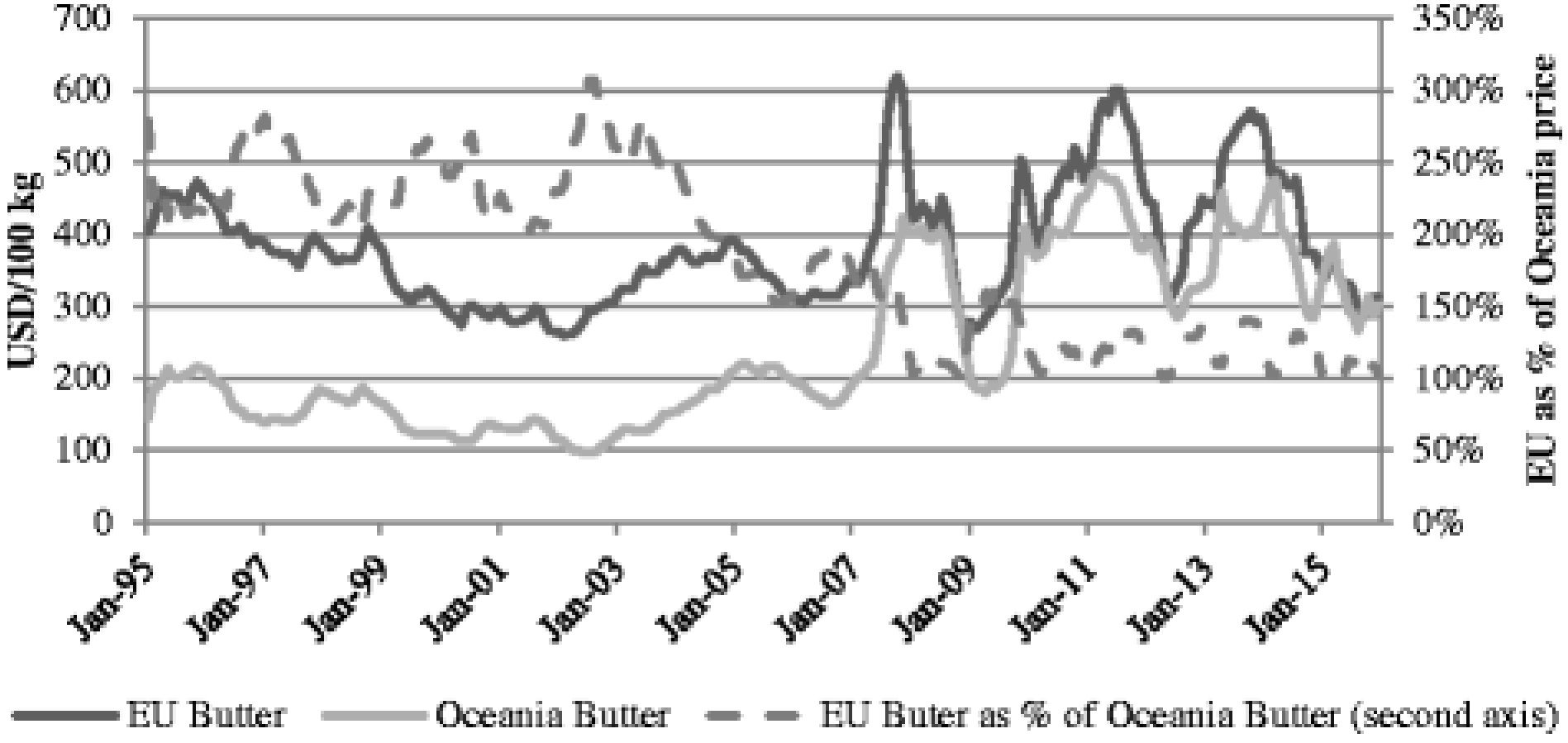
Source: Minot, N. 2010. AAMP Training materials "Module 3.2: Measuring Food Price Transmission" and "Transmission of world food price changes to markets in sub-Saharan Africa." Discussion Paper No. 1059. International Food Policy Research Institute, Washington, DC. http://www.ifpri.org/publication/transmission-world-food-price-changes-markets-sub-saharan-africa

Spatial price transmission

- **Spatial price transmission** occurs because of flows of goods between markets
  - If price gap > marketing costs, trade flows will narrow gap
  - If price gap < marketing cost, no flows
  - Therefore, price gap <= marketing cost

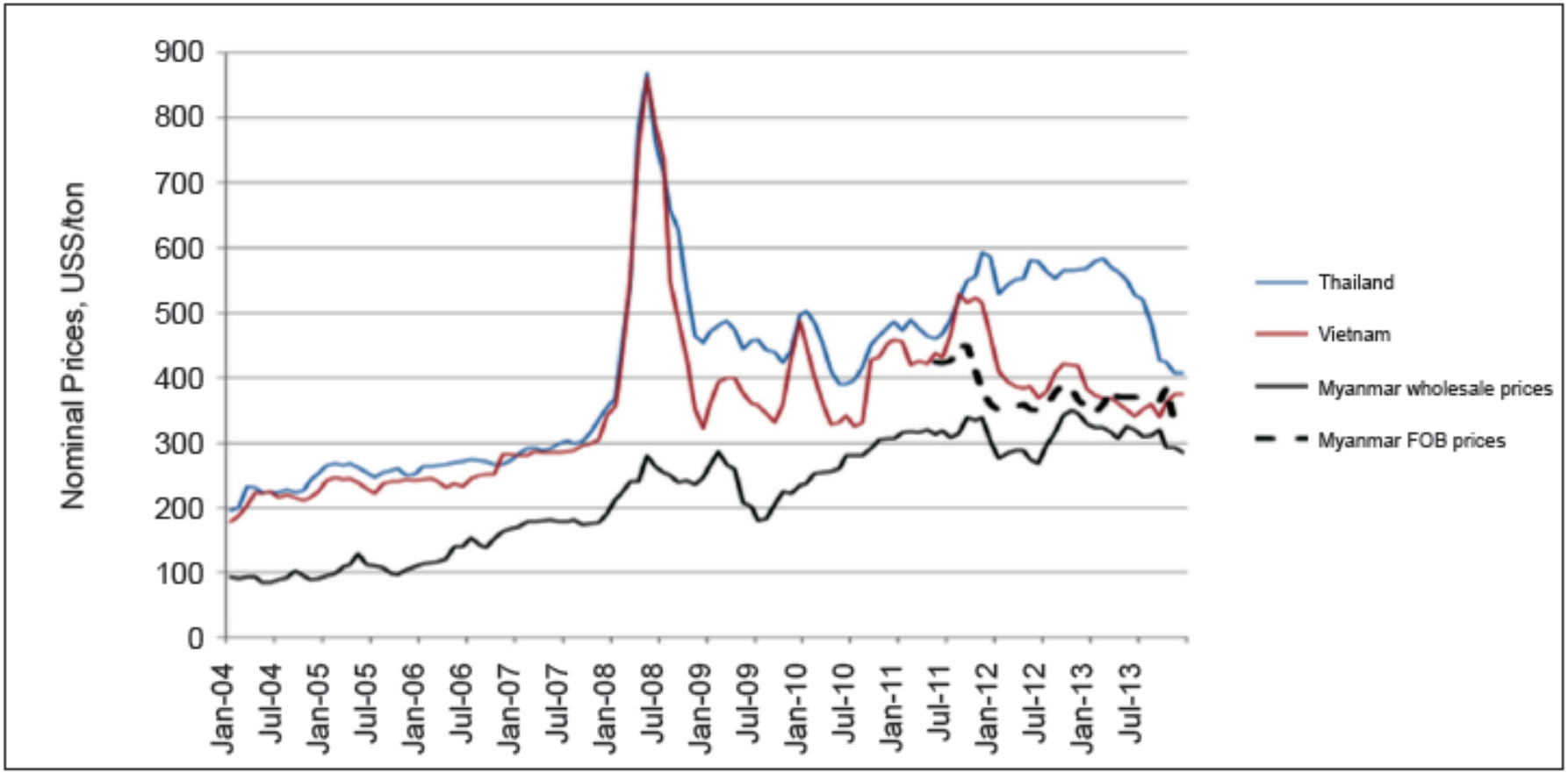
Source: Minot, N. 2010. AAMP Training materials "Module 3.2: Measuring Food Price Transmission" and "Transmission of world food price changes to markets in sub-Saharan Africa." Discussion Paper No. 1059. International Food Policy Research Institute, Washington, DC. http://www.ifpri.org/publication/transmission-world-food-price-changes-markets-sub-saharan-africa

Relationship between EU and Oceania Butter (1995 to 2015)



https://agrifoodecon.springeropen.com/articles/10.1186/s40100-016-0067-4#Fig9

Figure 6: Selected export rice prices, $/ton



Note: Thailand and Vietnam prices are export prices for 25% brokens.
Myanmar prices are wholesale and FOB prices for Emata in Yangon, 25% brokens.

Source: MIS/MOAI (2014), MOC (2014), and FAO-GIEWS (2014).

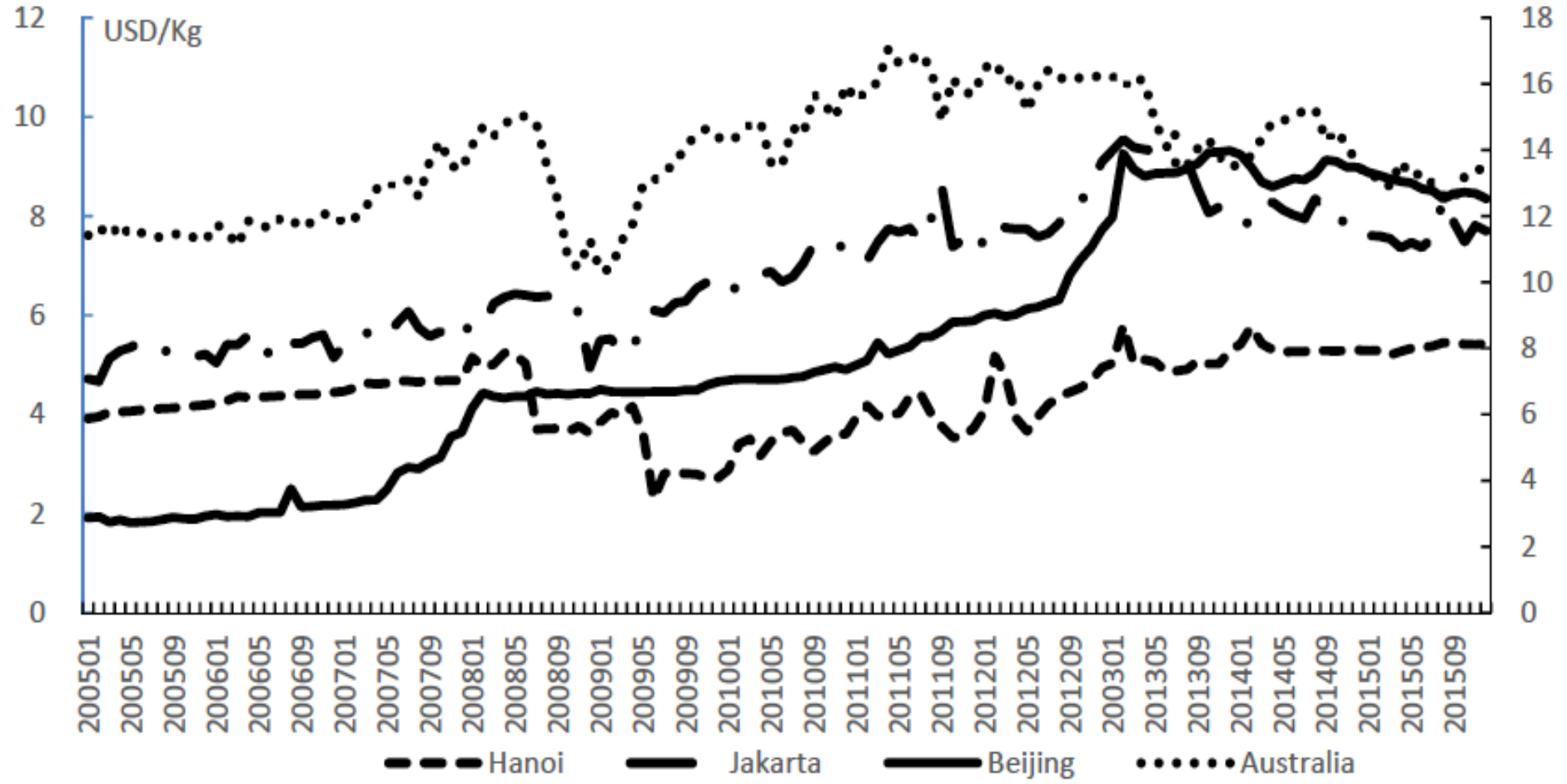


Fig 1. Beef retail price in Australia, Beijing, Jakarta and Hanoi from 2005 to 2015

Notes: left axes are Hanoi, Jakarta and Beijing. Right axes is Australia.

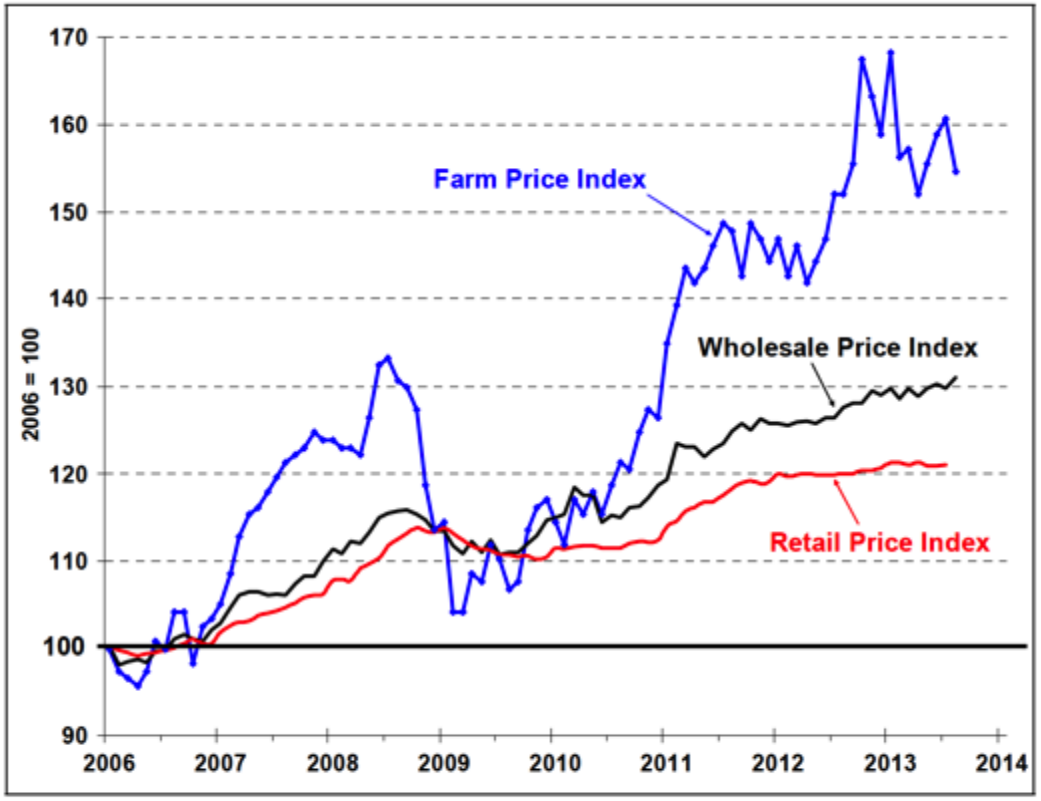
http://www.asiabeefnetwork.com/wp-content/uploads/2017/02/170207-draft-Price-Transmission-in-Regional-Beef-Markets-Dong-et-al_.pdf

Vertical price transmission

- **Vertical price transmission** occurs because of flows of goods along marketing channel
- Derived Demand = The demand for inputs that are used to produce the final products.
- Examples:
  - Bread => Flour => wheat
  - Soy Milk => Soybean meal => soybeans
  - Beef => cattle
  - Wine => Grapes
  - Chili sauce => chillis

Vertical Markets and Prices

Figure 1. Price Indexes for Farm, Wholesale, and Retail Food Products, 2006-2013



Source: The Farm Price Index is the farm food commodities prices-received index from the National Agricultural Statistics Service (NASS), USDA; the Retail Price Index is the Food-at-Home CPI from the Bureau of Labor Statistics (BLS); and the Wholesale Price index is the Producer Price Index (PPI) for Finished Consumer Foods from BLS.

Schnepf, R. 2013. "Farm-to-Food Price Dynamics." Congressional Research Service CRS Research Report R40621US Government.
http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R40621.pdf

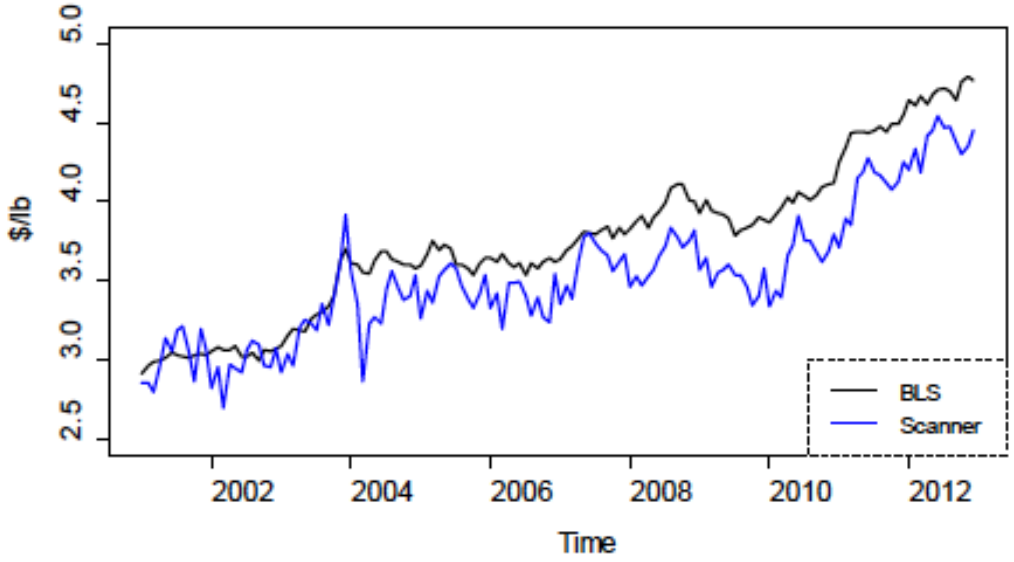


Figure 1. Monthly Retail BLS and Scanner Beef Prices, January 2001- December 2012.

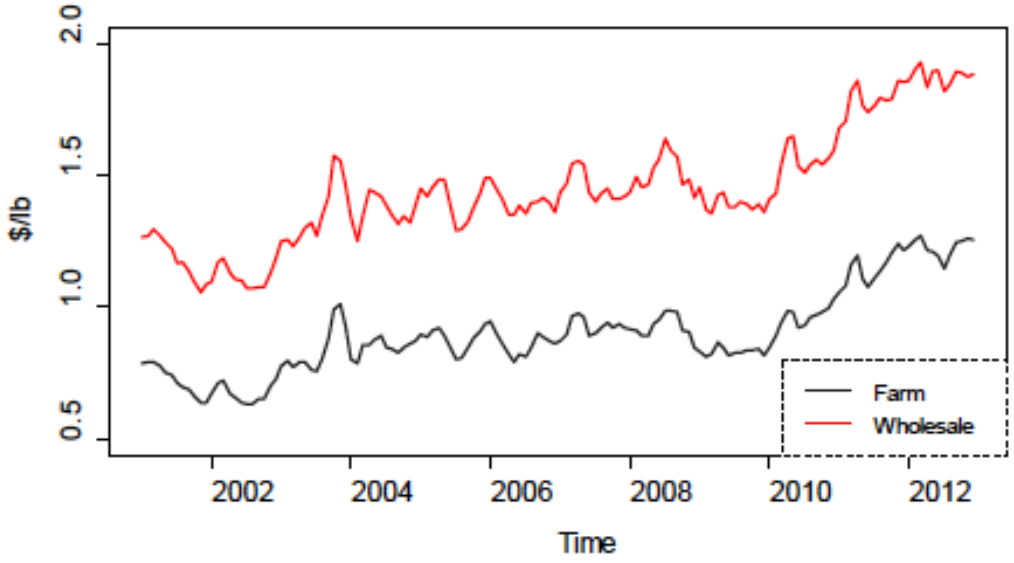
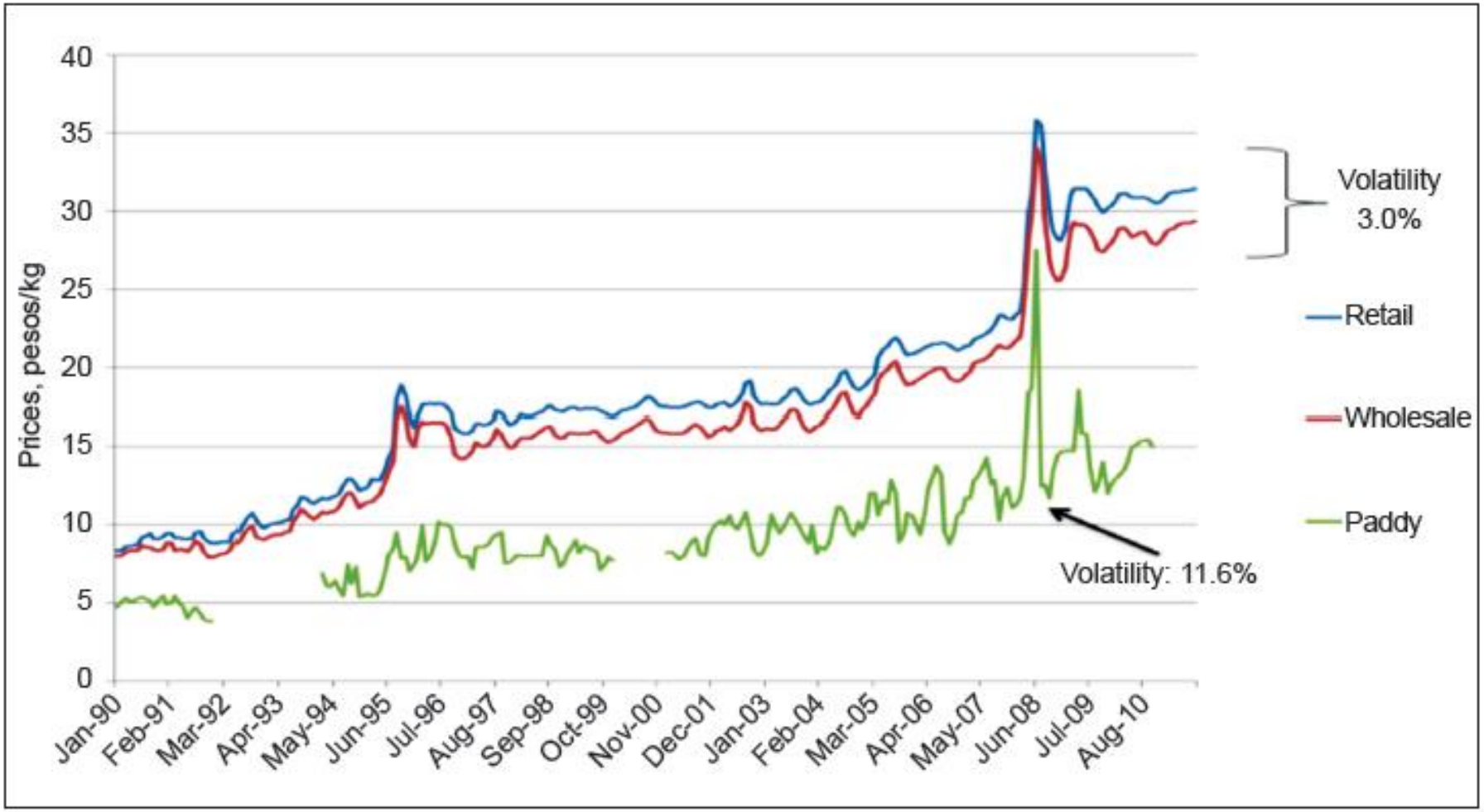


Figure 2. Monthly Feed Cattle and Wholesale Beef Prices, January 2001- December 2012.

Figure 14: Philippines: Volatility of farm-gate, wholesale and retail prices, 1990-2011



Source: Authors' estimates based on data from the Philippine Bureau of Agricultural Statistics.

Cross-commodity price transmission?

- **Cross-commodity price transmission** occurs because of substitution in consumption and/or production

Source: Minot, N. 2010. AAMP Training materials "Module 3.2: Measuring Food Price Transmission" and "Transmission of world food price changes to markets in sub-Saharan Africa." Discussion Paper No. 1059. International Food Policy Research Institute, Washington, DC. http://www.ifpri.org/publication/transmission-world-food-price-changes-markets-sub-saharan-africa

Why might price transmission not occur?

- High transportation cost makes trade unprofitable
- Trade barriers make trade unprofitable
- Goods are imperfect substitutes (e.g. imported rice and local rice)
- Lack of information about prices in other markets
- Long time to transport from one market to another (lagged transmission)
- Policy or market power

Source: Minot, N. 2010. AAMP Training materials "Module 3.2: Measuring Food Price Transmission" and "Transmission of world food price changes to markets in sub-Saharan Africa." Discussion Paper No. 1059. International Food Policy Research Institute, Washington, DC. http://www.ifpri.org/publication/transmission-world-food-price-changes-markets-sub-saharan-africa

Market Failures?

- Public goods – food security, food safety
- Externalities – increasing use of inputs, climate change, obesity and NCD
- Market power
  - Buyer and seller side
  - Prices - too high or too low?
  - Access to innovative products and technologies?
- Asymmetric information
  - Info. missing or incorrect
  - Inefficient purchasing decisions

Factors Affecting Supply and Demand

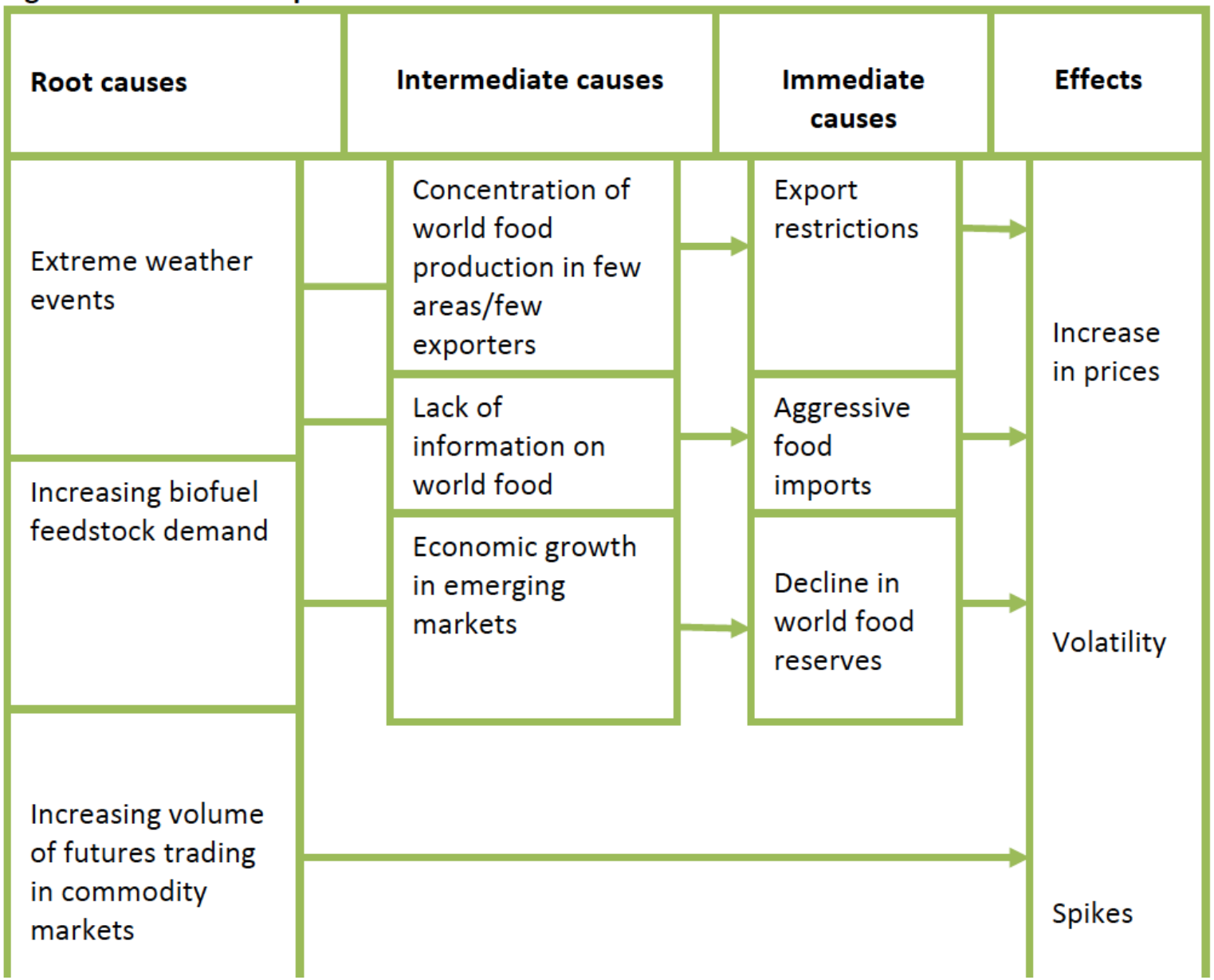
2.3.1 External drivers of food prices

	Supply	Demand
Low variance	Seed technology	Population growth
	Irrigation	Income growth
	Total harvested area	Dietary changes and tastes
	Climate change	Meat and livestock economy
	Knowledge and management skills	
High variance	Weather	Exchange rates
	Diseases	Speculation
	Crop-specific harvested area	Biofuels (but predictable from mandates; not predictable from oil prices)
	Fuel costs	Panic or hoarding
	Fertilizer costs	Government trade and inventory policies

Source: Author.

Source: Timmer (2008) "Causes of High Food Prices." Asian Development Outlook 2008 Update. P. 78

Figure 7 - Global food price drivers



Joachim von Braun and Getaw Tadesse, Global Food Price Volatility and Spikes: An Overview of Costs, Causes, and Solutions, ZEF- Discussion Papers on Development Policy No. 161, Center for Development Research, Bonn, January 2012, pp. 42.

Elasticities

- Demand Elasticity
- Supply Elasticity
- Cross-price elasticity
- Income elasticity

Price Elasticity of Demand

- **The price elasticity of demand is the percentage change in the quantity demanded of a good divided by the percentage change in its price**
- Elasticity does not depend on units of measurement

Elasticity of Demand

$$E_{px} = \frac{\text{Percentage change in } \textbf{quantity demanded} \text{ of } \textit{good X}}{\text{Percentage change in the } \textbf{Price} \text{ of } \textit{good X}}$$

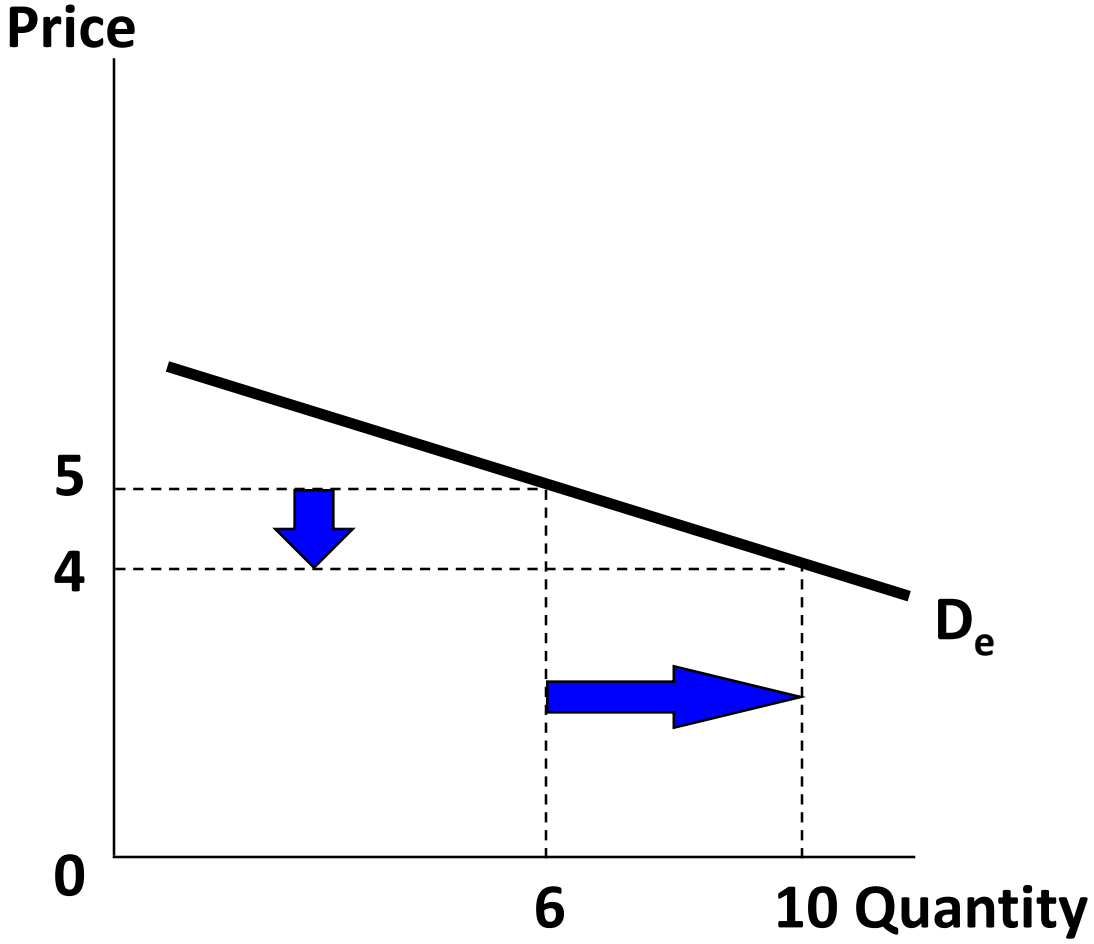
Elastic and inelastic demand

- **Perfectly elastic**: infinity
- **Elastic**: greater than one
- **Unit elastic**: one
- **Inelastic**: less than one
- **Perfectly inelastic**: zero

Why is price elasticity of demand important?

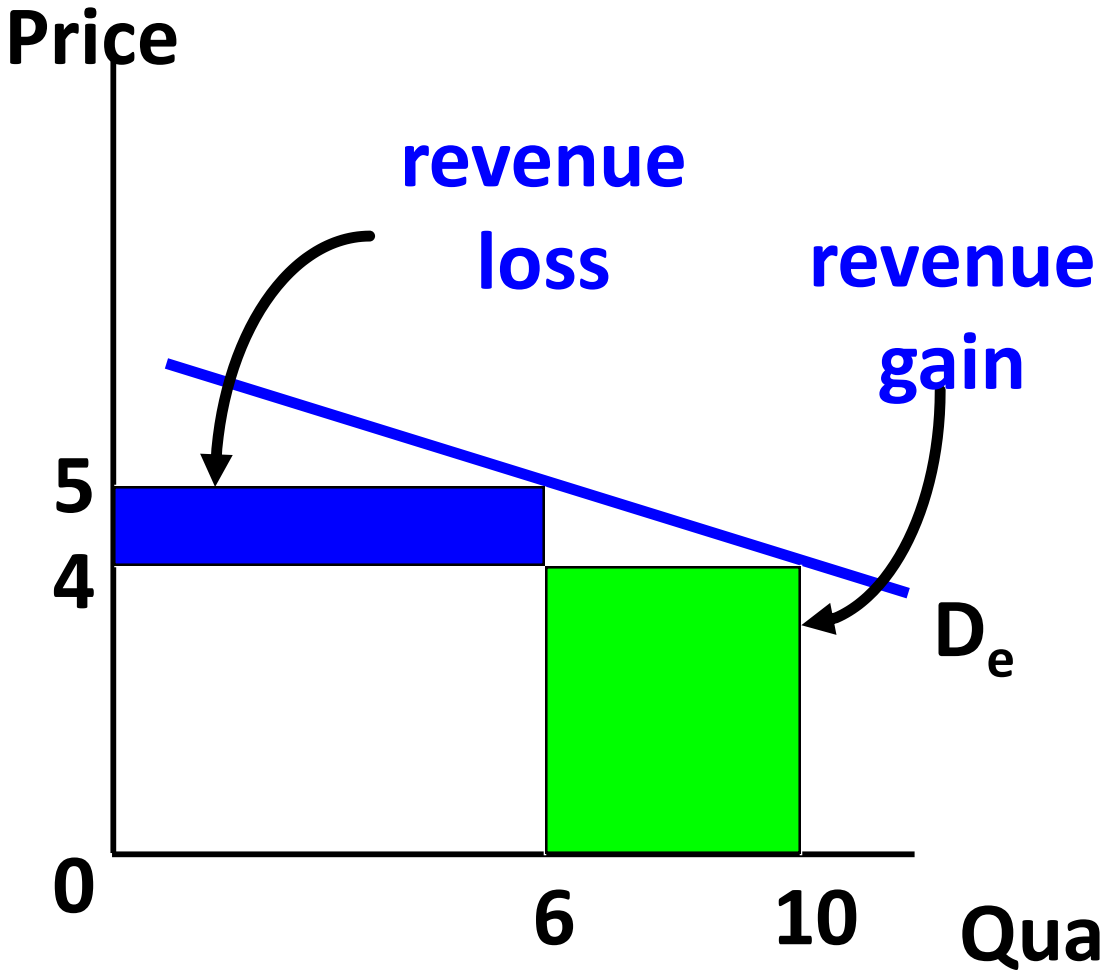
- Revenue projections
- Impact of taxation
- Incidence of tax
- Impact on economic welfare

What does a relatively elastic demand curve look like?



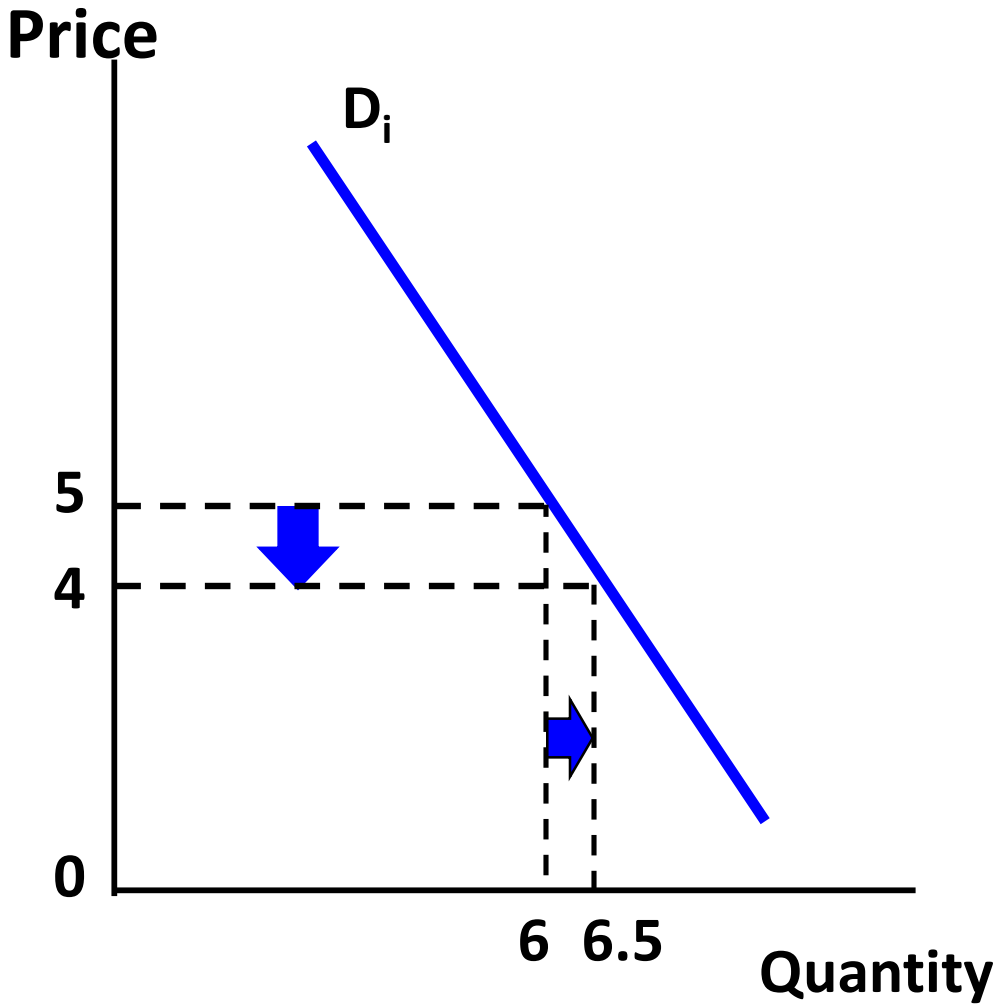
- A given change in price brings about a **more** than proportional change in quantity demanded

The change in revenue - Elastic



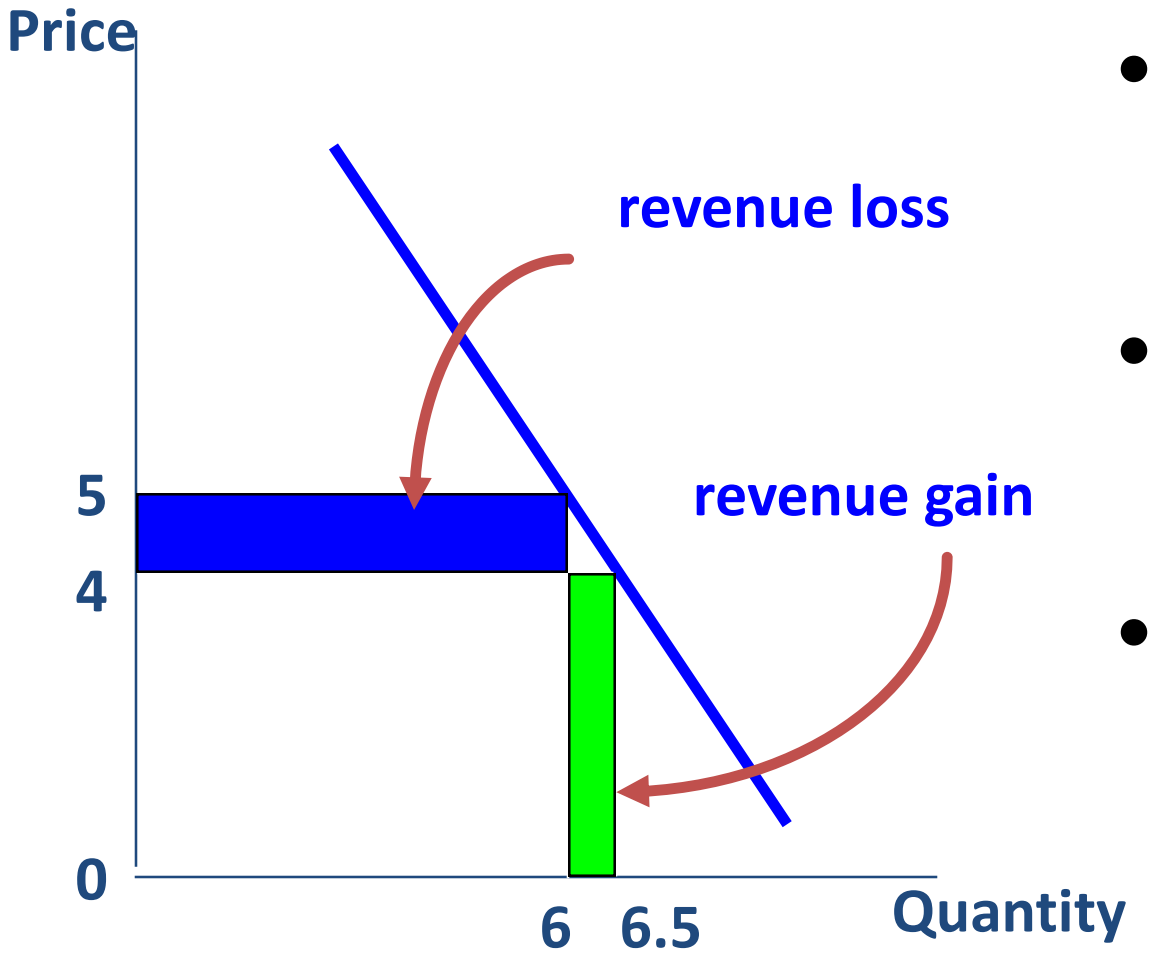
- Revenue loss = 1 ?? 6 = 6
- Revenue gain = 4 ?? 4 = 16
- Net revenue gain = 10

What does a relatively inelastic demand curve look like?



- A given change in price brings about a **less** than proportional change in quantity demanded

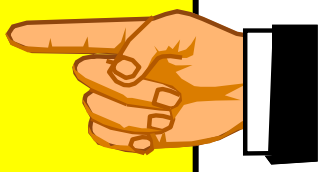
The change in revenue - Inelastic



- Revenue loss = $1 \times 6 = 6$
- Revenue gain = $4 \times 0.5 = 2$
- Net revenue loss = 4

Price Elasticity and Revenue Implications

Own-price elasticity is:	Cutting the price will:	Increasing the price will:
Elastic	Increase revenue	Decrease revenue
Unitary elastic	Not change revenue	Not change revenue
Inelastic	Decrease revenue	Increase revenue

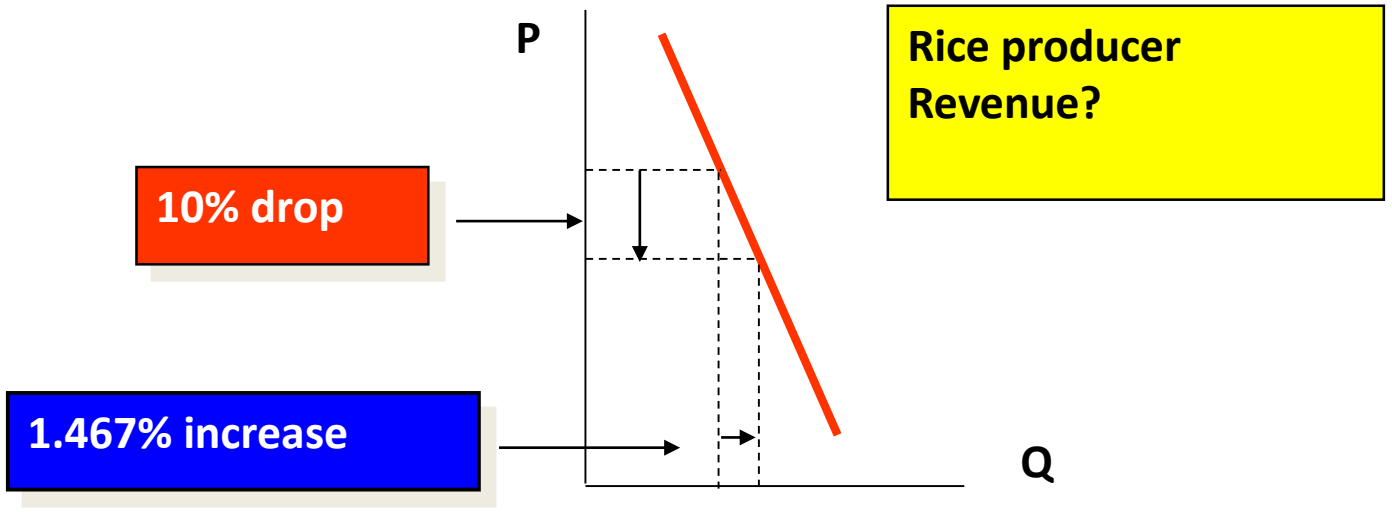


Characteristic of food

Interpretation

Let's take rice as an example, which has an own price elasticity of - 0.1467.

This suggests that if the price of rice drops by 10%, for example, the quantity of rice demanded will only increase by 1.467%.



Factors that Influence the Elasticity of Demand

- Substitutes
- Proportion of income spent on good
- Time elapsed since price change
- Luxuries versus necessities
- Price points
- Time periods

Drivers of More **Elastic** Demand

- Diverse preferences – people willing to eat many different kinds of foods, not just rice
- Availability of close substitute commodities for final consumption
- Availability of close substitutes for derived demand
- The commodity is NOT a necessity
- Higher incomes
- Luxury commodities

Drivers of More **Inelastic** Demand

- Rigid preferences – eating predominantly rice in Asia or maize in Southern Africa
- Limited or no close substitute commodities are available for final consumption –
  - e.g. maize, millet, sorghum and rice are all scarce
- Limited or no close substitutes for derived demand
- The commodity is a necessity
- Lower incomes

Cross Elasticity of Demand

$$E_{xy} = \frac{\text{Percentage change in quantity demanded of } \textit{good X}}{\text{Percentage change in the price of } \textit{good Y}}$$

Substitute Goods - Positive Sign
Complementary Goods - Negative Sign
Independent Goods - Zero or near-zero

Interpreting the Cross Price Elasticity of Demand

If the cross price elasticity is equal to:	The good is classified as:
Positive	Substitute
Negative	Complement
Zero	Independent

Income Elasticity of Demand

$$E_i = \frac{\text{Percentage change in quantity demanded}}{\textbf{Percentage change in income}}$$

Normal Goods - Positive Sign

Interpreting the Income Elasticity of Demand

If the income elasticity is equal to:	The good is classified as:
Greater than 1.0	A luxury ***and*** a normal good
Less than 1.0 but greater than 0.0	A necessity ***and*** a normal good
Less than 0.0	An inferior good!

Income & Own price elasticity of demand for food, beverage and tobacco

Country	GDP *Per capita*, 1996	Income elasticity	Own-price elasticity
Vietnam	USD 2 029	0.74	-0.76
Peru	USD 4 775	0.65	-0.66
Brazil	USD 8 196	0.62	-0.62
Poland	USD 8 839	0.58	-0.58
Korea	USD 17 613	0.47	-0.47
France	USD 24 203	0.32	-0.32
United States	USD 34 287	0.09	-0.09

Meade, B., A. Regmi, J.L. Seale, A. Muhammad. 2014. "**New International Evidence on Food Consumption Patterns" USDA Economic Research Service.**
http://www.ers.usda.gov/data-products/international-food-consumption-patterns.aspx#.U4vUOy88-mF

Examples: Income elasticity food, beverages and tobacco

Table 31. Income Elasticities of Demand for Selected Countries from Seale and Regmi (2006)

Country	GDP *Per capita*, 1996	Beverages and Tobacco	Cereals	Meat	Fish	Dairy	Oils and Fats	Fruits and Vegetables	Other Food
Vietnam	USD 2 029	1.43	0.59	0.79	0.88	0.83	0.55	0.64	0.79
Peru	USD 4 775	0.93	0.47	0.69	0.75	0.72	0.41	0.54	0.69
Brazil	USD 8 196	0.87	0.44	0.66	0.71	0.68	0.37	0.52	0.66
Poland	USD 8 839	0.79	0.40	0.62	0.66	0.64	0.33	0.48	0.62
Korea	USD 17 613	0.63	0.31	0.50	0.54	0.52	0.24	0.38	0.50
France	USD 24 203	0.41	0.19	0.34	0.36	0.35	0.12	0.26	0.34
United States	USD 34 287	0.12	0.05	0.10	0.10	0.10	0.03	0.07	0.10

Note: GDP *per capita* is PPP converted, in 2005 prices, and is the chain series from Heston *el al.* (2009).

Elasticity Examples

Product	Share of budget (% of household income)	Price elasticity of demand (Ped)	Income elasticity of demand (Yed)
All Foods	15.1	n/a	0.2
Fruit juices	0.19	-0.55	0.45
Tea	0.19	-0.37	-0.02
Instant coffee	0.17	-0.45	0.16
Margarine	0.03	n/a	-0.37

Source: DEFRA www.defra.gov.uk

Price Flexibility

Price flexibility is the reciprocal of the own-price elasticity. If the calculated elasticity is - 0.25, then the *flexibility would be - 4.0*.

This is a useful concept to producers when forming expectations for the current year. If the Government projects an additional 2% of supply will likely come on the market, then producers know the price will likely drop by 8%, or:

$$\%\Delta Price = -4.0 \times \%\Delta Quantity$$
$$= -4.0 \times (+2\%)$$
$$= -8\%$$

If supply increases by 2%, price would fall by 8%!

Note: make sure you use the negative sign for both the elasticity and the flexibility.

Drivers of More **Elastic** Supply

- Many close substitutes
- Significant competition among sellers
- More continuously produced
- Available stocks
- Limited market barriers – e.g. few formal or informal fees and legal restrictions
- Good market infrastructure – good roads, telecommunications, etc
- Significant excess capacity
- Expectations that prices will be decreasing
- Adjustment period is longer – e.g., several months as opposed to a few days or a week

Drivers of More **Inelastic** Supply

- Few close substitutes
- Lack of competition among sellers
- Produced (harvested) infrequently
- Limited or no stocks
- Market barriers – formal and informal fees or restrictions
- Poor market infrastructure
- Expectations that prices will be increasing (speculation)

What drives ag & food market dynamics

Consumption

- Population
- Disposable income
- Changing behavior and attitudes
- Perceptions about food safety and quality
- Government
- Trade policy
- Non-food use

Production

- Technology
- Market structure
  - Consolidation
  - Integration
  - Market power
- Environment and Resources
  - Weather
  - Climate
  - Biodiversity
  - Soil quality
- Policy

Thank you! Questions?

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http://www.adelaide.edu.au/global-food/blog/wendy.umberger@adelaide.edu.au