China’s Meat Import Demand: The Impact of Supplier Diversification on U.S. Exports

Mina Hejazi, Jue Zhu, Mary A. Marchant, and Xin Ning

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The Impact of Supplier Diversification on U.S. Exports

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IATRC, Dec. 3-5, 2017
Washington, DC

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Outline

► Overview of China's Trade Diversification Strategy
► China's Meat Imports Trends
► Objectives
► Empirical Model
► Results
► Conclusions
Motivation

- China has emerged as a leading importer in the global meat market
  - Trade liberalization
    - Accession to the WTO in 2001
  - Rising living standards
  - Changing consumption patterns
  - Between 2001 and 2016, the total value of meat imports increased by over 1600%
In 2001, China ranked 16th with meat imports of only $0.6 billion.
In 2016, China’s imports increased to $10.3 billion, ranked number one.
Annual import growth rate: beef (49.8%), pork (33.6%), and poultry (7.3%)
China’s Trade Diversification Strategy

► To provide greater opportunities for Chinese meat importers
► To negotiate lower prices
► To reduce risks from supply disruptions

New Strategy

► The 2015 No.1 Document called for China to diversify sources of imports.
  ► Expand free trade agreements
  ► Ex. Australia, New Zealand, Chile
  ► Increase in China’s import protocol on meat products

Impact of the New Strategy

► Opens China’s meat market to new countries and increases competition for exporting countries, including U.S. meat exporters
Research Objectives

► Explore the impact of China’s trade diversification strategy on the global meat market
► Develop a Restricted Source Differentiated Almost Ideal Demand System (RSDAIDS)
► Develop projections for China’s meat import demand based on the elasticities and China’s expanding FTAs
Literature Review

Meat import demand by source

► Henneberry and Hwang, 2007—South Korean Meat Import Market
► Mutondo and Henneberry, 2007—Both Japan and South Korea
► Cheng, Hao, Geo, and Seale, 2015—China meat import demand

China

► Japan and South Korea are important to the U.S., but China is the future.
► Population: 1.4 billion
► GDP growth: 6.7% annual change in 2016
In 2004 U.S. lost its market share (BSE outbreak) where China banned U.S. beef products, reopened U.S. market in May 2017

In 2016, Australia (19%), Brazil (30%), and Uruguay (27%) captured the U.S. share
During 2001 to 2011, the EU, U.S. & Canada were the largest exporters to China (98% of the total China’s import)

China has a zero-tolerance for ractopamine in pork

Since 2012 the EU dominated this market; average market share of 65%.

Brazil entered China’s market in recent years, 5% market share in 2016.
The U.S., Brazil & Argentina accounted for the bulk of China’s imports

The U.S. has historically been the dominant supplier.

Since 2010, Brazil surpassed the U.S. as the largest poultry exporter to China due to the U.S. Avian Influenza outbreak & trade restrictions.
Data

- Monthly data: January 2001 to August 2017
- Meat import data collected from the Global Trade Atlas at the 4-digit HS level
- Import values and quantities
  - Import price
  - Tariffs are collected from the WTO and FTAs
- Meat categories:
  - Beef, pork, poultry, mutton and other parts

Top meat suppliers to China

- Beef: Australia, Brazil, New Zealand, Uruguay, the U.S. & the ROW
- Pork: Canada, the EU, the U.S. & ROW
- Poultry: Argentina, Brazil, the U.S. & the ROW
Restricted Source Differentiated Almost Ideal Demand System (RSDAIDS)

- Apply a restricted source differentiated meat import demand (RSDAIDS) model

\[
(1) \quad w_{ih} = \alpha_{ih} + \sum_k \gamma_{ihk} \ln(p_{ik}) + \sum_{j \neq i} \gamma_{ihj} \ln(p_j) + \beta_{ih} \ln\left(\frac{E}{p^*}\right)
\]

- \( i \): meat; \( h \): source country; \( t \): month
- \( w_{ih_t} \) = the budget share of good \( i \)
- \( \ln(p_{jt}) = \sum_k w_{jk} \ln(p_{jkt}) \)
- \( E_t \) = the total expenditure of all imported meat
- \( P_t^* \) = price index
Results - China Beef Imports from its main Suppliers
Uncompensated own price, cross price and expenditure elasticities (e.)

### Beef: own-price e. & cross-price e. within different sources

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>Brazil</th>
<th>New Zealand</th>
<th>Uruguay</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>-0.944***</td>
<td>-0.186***</td>
<td>0.0562**</td>
<td>0.0188</td>
<td>-0.0300**</td>
</tr>
<tr>
<td>Brazil</td>
<td>-0.581***</td>
<td>0.0532</td>
<td>-0.304***</td>
<td>-0.374***</td>
<td>0.0744*</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0.151**</td>
<td>-0.303***</td>
<td>-1.003***</td>
<td>0.0314</td>
<td>-0.00213</td>
</tr>
<tr>
<td>Uruguay</td>
<td>0.0221</td>
<td>-0.235***</td>
<td>0.0212</td>
<td>-0.922***</td>
<td>-0.00389</td>
</tr>
<tr>
<td>U.S.</td>
<td>-0.0418</td>
<td>0.0526**</td>
<td>0.0043</td>
<td>0.00484</td>
<td>0.144</td>
</tr>
</tbody>
</table>

### Beef: cross-price e. b/w different meats & expenditure e.

<table>
<thead>
<tr>
<th></th>
<th>Australia</th>
<th>Brazil</th>
<th>New Zealand</th>
<th>Uruguay</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork</td>
<td>0.631*</td>
<td>2.949***</td>
<td>0.26</td>
<td>0.244</td>
<td>-1.643*</td>
</tr>
<tr>
<td>Poultry</td>
<td>-0.985***</td>
<td>3.573***</td>
<td>1.445***</td>
<td>0.663*</td>
<td>1.716*</td>
</tr>
<tr>
<td>Expenditure</td>
<td>2.317***</td>
<td>2.834***</td>
<td>2.812***</td>
<td>2.700***</td>
<td>0.679***</td>
</tr>
</tbody>
</table>
Results - China Beef Imports from its main Suppliers
Uncompensated own price, cross price and expenditure elasticities (e.)

- **Own-price elasticities** for China’s beef imports across main suppliers. It is negative & statistically significant for Australia (not elastic), New Zealand (elastic) & Uruguay (not elastic)

- Cross-price elasticities **within** specific meat across different sources, a substitutability relationship between Australia & New Zealand; Brazil & the U.S.

- Cross-price elasticities **between** different types of meat:
  - a substitutability relationship between pork & beef imports from Australia and Brazil
  - a substitutability relationship between poultry & beef imports from Brazil, New Zealand, Uruguay & the U.S.

- **Expenditure elasticities** are positive, statistically significant & elastic across all source countries, except the U.S.
## Pork: own-price e. & cross-price e. within different sources

<table>
<thead>
<tr>
<th></th>
<th>Canada</th>
<th>EU</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>-0.697***</td>
<td>-0.0852</td>
<td>-0.248**</td>
</tr>
<tr>
<td>EU</td>
<td>-0.0599</td>
<td>-0.817***</td>
<td>-0.297***</td>
</tr>
<tr>
<td>U.S.</td>
<td>-0.136**</td>
<td>-0.375***</td>
<td>-0.442***</td>
</tr>
</tbody>
</table>

## Pork: cross-price e. b/w different meats & expenditure e.

<table>
<thead>
<tr>
<th></th>
<th>Canada</th>
<th>EU</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>0.0245</td>
<td>-0.134**</td>
<td>-0.275*</td>
</tr>
<tr>
<td>Poultry</td>
<td>-0.019</td>
<td>-0.479***</td>
<td>0.442</td>
</tr>
<tr>
<td>Expenditure</td>
<td>0.981***</td>
<td>2.152***</td>
<td>1.101***</td>
</tr>
</tbody>
</table>
Results - China Pork Imports from its main Suppliers
Uncompensated own price, cross price and expenditure elasticities (e.)

- **Own-price elasticities** for China’s pork imports across main suppliers. Own-price elasticities are negative and statistically significant across all source countries (not elastic).

- **Cross-price elasticities within** specific meat across different sources, a weak complementary relationship between Canada & the U.S.; a weak complementary relationship between the EU & the U.S.

- **Cross-price elasticities between** different types of meat, beef and poultry are a weak complementary for source differentiated beef imports.

- **Expenditure elasticities** elastic for the EU (strong) & the U.S., but inelastic for Canada.
### Results - China Poultry Imports from its main Suppliers
Uncompensated own price, cross price and expenditure elasticities (e.)

#### Poultry: own-price e. & cross-price e. within different sources

<table>
<thead>
<tr>
<th></th>
<th>Argentina</th>
<th>Brazil</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>-1.311***</td>
<td>-0.675**</td>
<td>1.271***</td>
</tr>
<tr>
<td>Brazil</td>
<td>-0.259**</td>
<td>-0.955***</td>
<td>-0.158</td>
</tr>
<tr>
<td>U.S.</td>
<td>0.181***</td>
<td>-0.0295</td>
<td>-0.834***</td>
</tr>
</tbody>
</table>

#### Poultry: cross-price e. b/w different meats & expenditure e.

<table>
<thead>
<tr>
<th></th>
<th>Argentina</th>
<th>Brazil</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>-0.401**</td>
<td>0.859***</td>
<td>-0.0747</td>
</tr>
<tr>
<td>Pork</td>
<td>1.856***</td>
<td>-0.978***</td>
<td>-0.202</td>
</tr>
<tr>
<td>Expenditure</td>
<td>0.322**</td>
<td>1.122***</td>
<td>0.230**</td>
</tr>
</tbody>
</table>
Results-China Poultry Imports from its main Suppliers
Uncompensated own price, cross price and expenditure elasticities (e.)

- **Own-price elasticities** for China’s poultry imports across main suppliers. It is negative and statistically significant across all source countries, Argentina (elastic).

- **Cross-price elasticities within** specific meat across different sources, a substitutability relationship between Argentina and the U.S.; a complementary relationship between Argentina and Brazil.

- **Cross-price elasticities between** different types of meat:
  - A complementary relation between beef and poultry from Argentina
  - A substitutability relationship between beef and poultry from the Brazil
  - A substitutability relationship between pork and poultry from Argentina

- **Expenditure elasticities** are positive, statistically significant across all sources.
China’s Meat Import Projections from 2017 to 2025 (Base=2016)

- Countries with existing FTAs with China
  (New Zealand, Australia)

- China expands FTAs to its main meat suppliers, excluding the U.S. (Argentina, Brazil, Canada, the EU, and Uruguay)
Conclusions

► This research provides detailed information about China’s meat import demand.

Beef
► Australia, Uruguay have the largest export growth potential (inelastic demand response to price changes, but elastic to changes in expenditure).
► Australia competes with New Zealand (substitute suppliers for China’s beef imports); and the U.S. competes with Brazil in the China’s beef import market.

Pork
► The EU has the largest export growth potential.
► No competing among main suppliers of pork, the EU, the U.S. and Canada in the pork import market.

Poultry
► Brazil has the largest export growth potential.
► The U.S. competes with Argentina in the poultry import market.
Thank You

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- Jue Zhu, Nanjing Agricultural University
- Mary A. Marchant, Virginia Tech
- Xin Ning, Virginia Tech
China’s Meat Consumption

Continued growth projected in China’s per capita meat consumption

Kilograms per person


Source: USDA Production, Supply and Distribution database and projections.

China in the Next Decade: Rising Meat Demand and Growing Imports of Feed, by James Hansen and Fred Gale, 2014, AmberWaves