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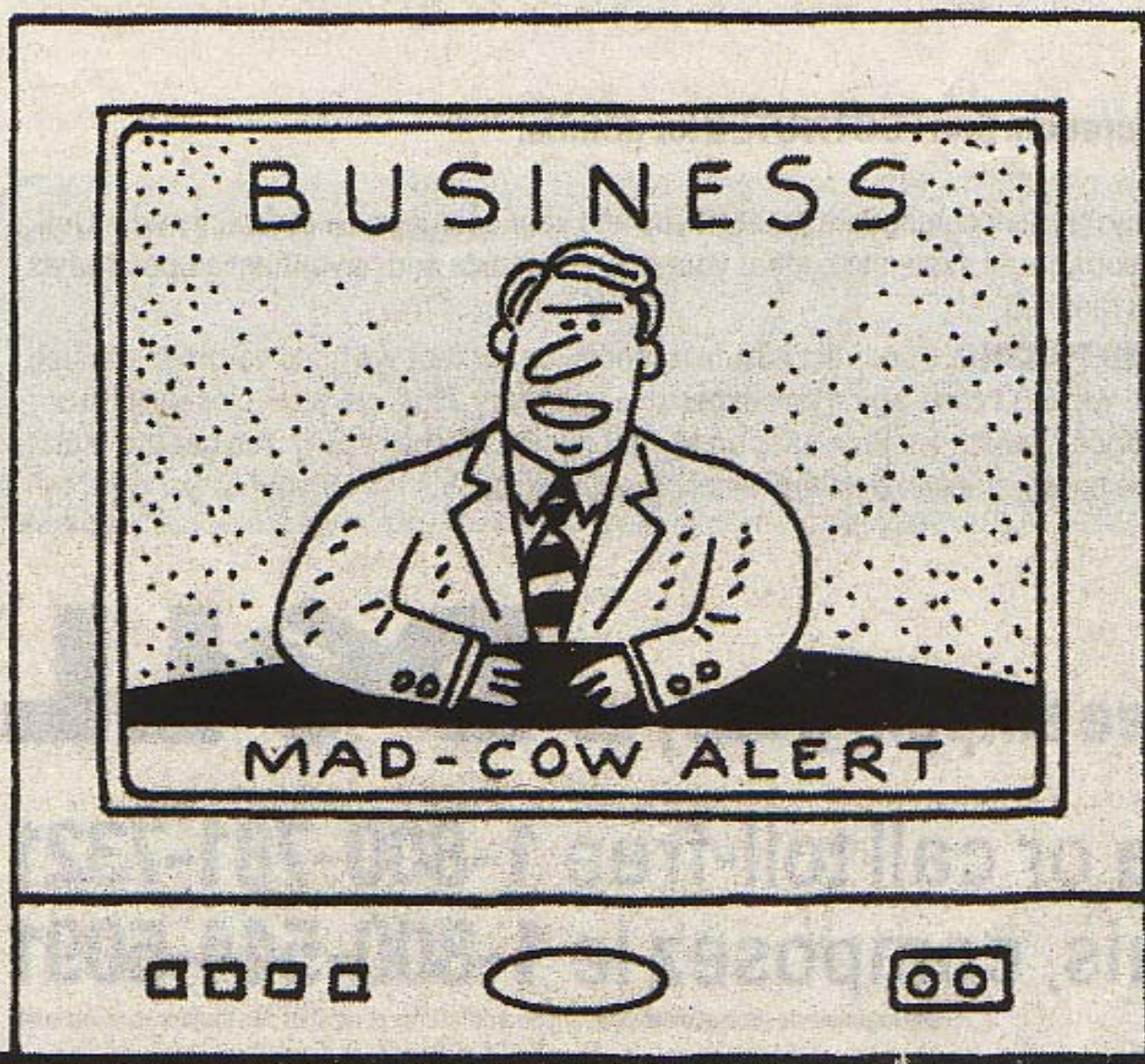
Issues in Modeling Bioterrorism in the Agrifood Sector

Karen Huff and Karl Meilke
University of Guelph

Calum Turvey
Rutgers University

WCC-72, Las Vegas

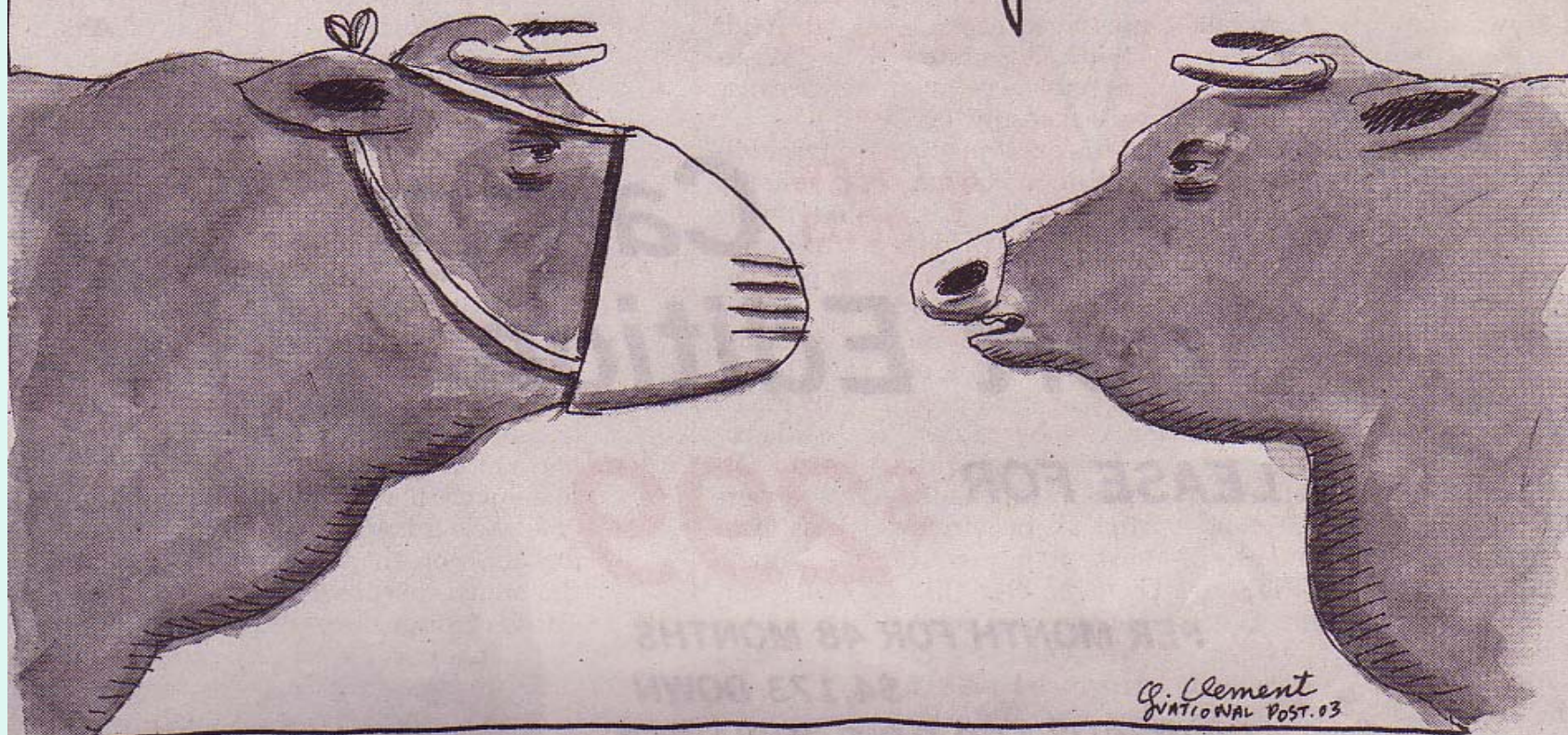
June 9, 2003



Brown.

'In futures trading today, it was a bear market for bulls.'

That won't help.



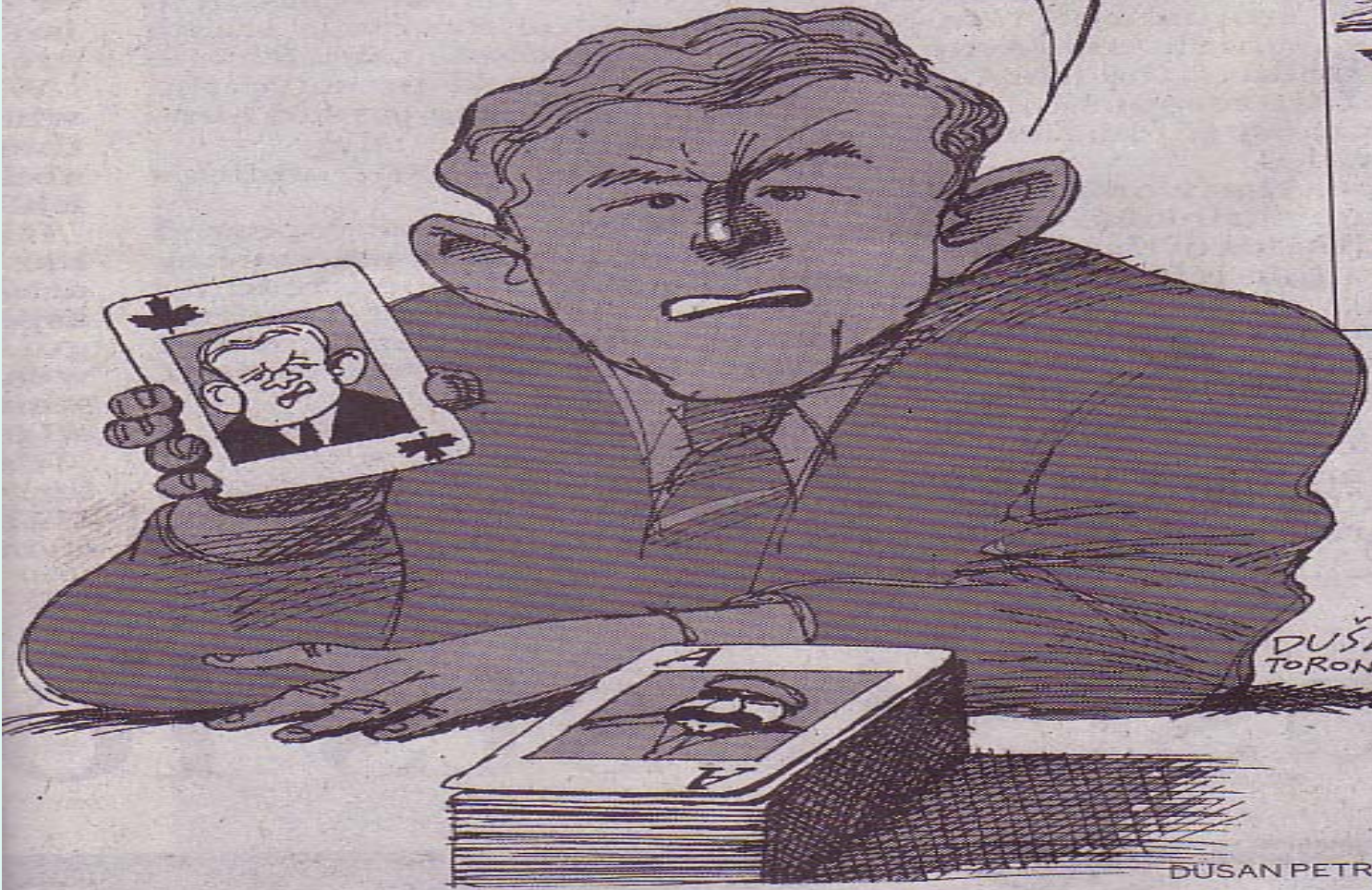
C. Clement
NATIONAL POST. 03

Key Issues

- Canada and Mexico Joined the NAFTA to Obtain Preferred (tariff free) and More Secure Access to the United States Market
 - How Can This Access be Maintained – While Meeting Legitimate Security Concerns?
 - How Real is the Bioterrorism Threat?
 - What Would be the Economic Effects of a Bioterrorism Attack?

IS THERE
ROOM
FOR ANOTHER
CARD?

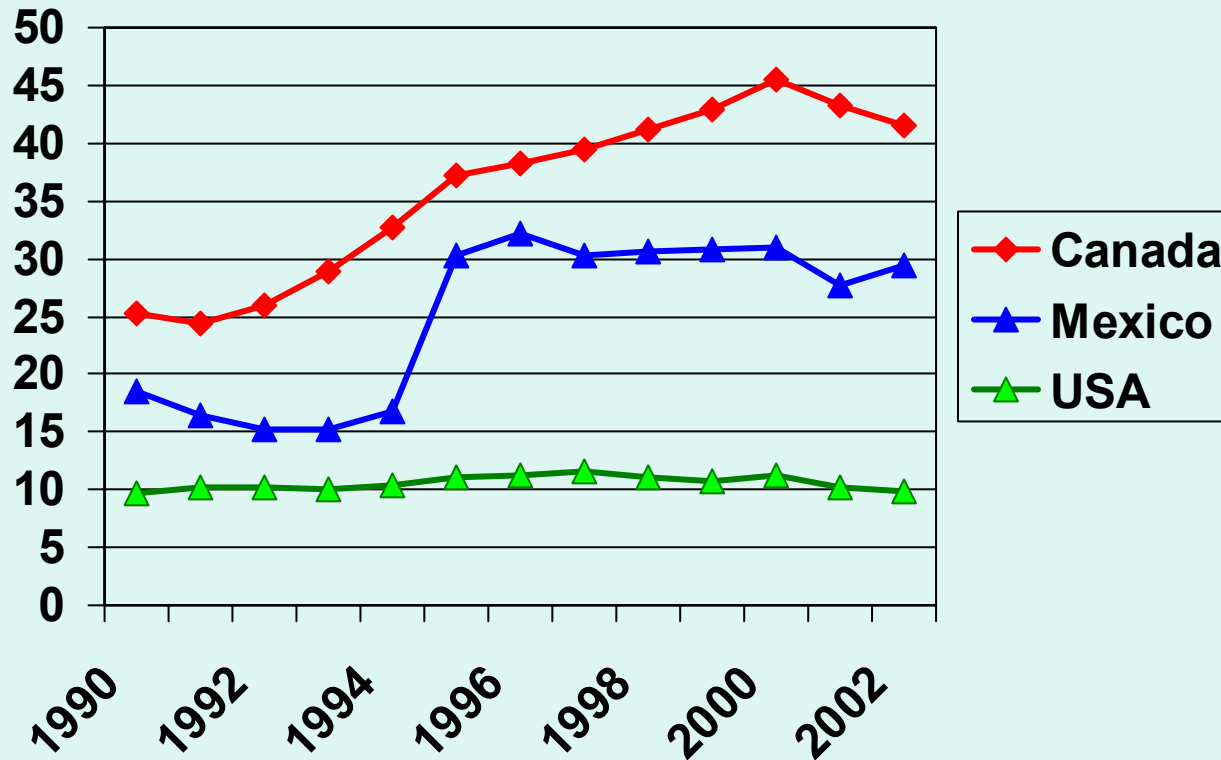
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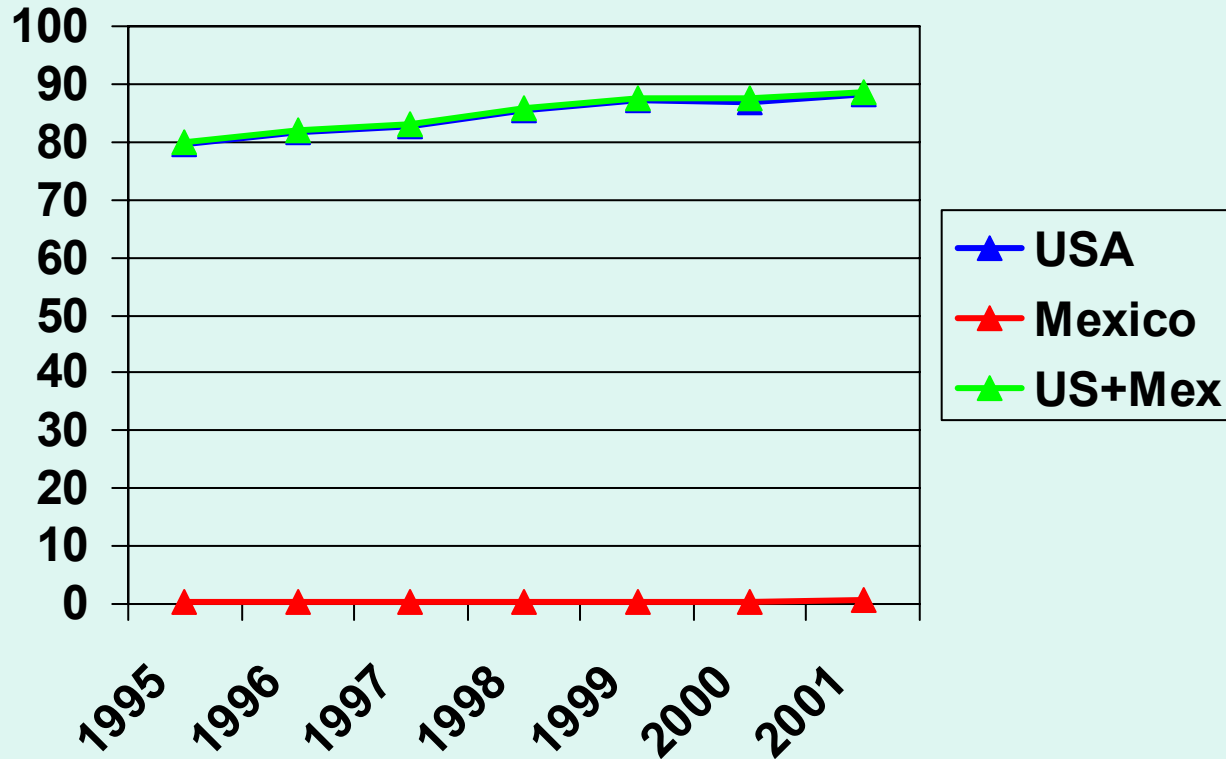
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DUSAN PETRICIC

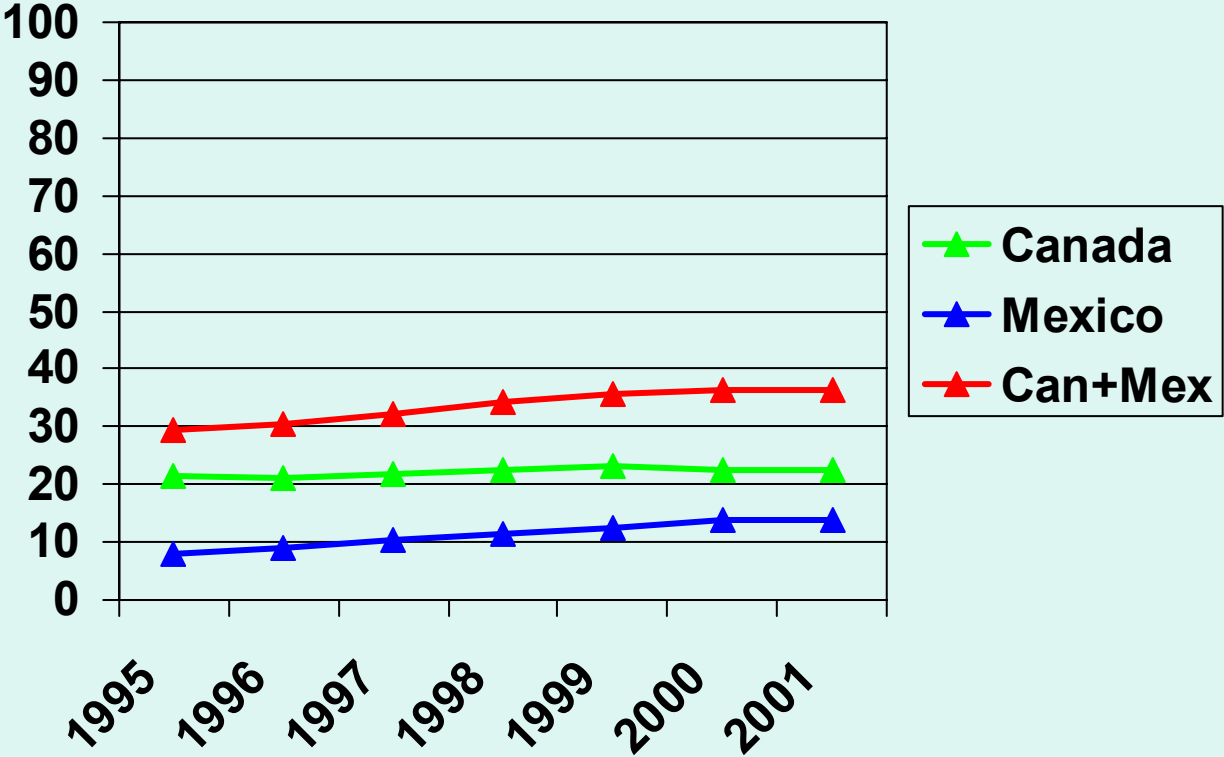
Fraction of GDP Exported, 1990-2002



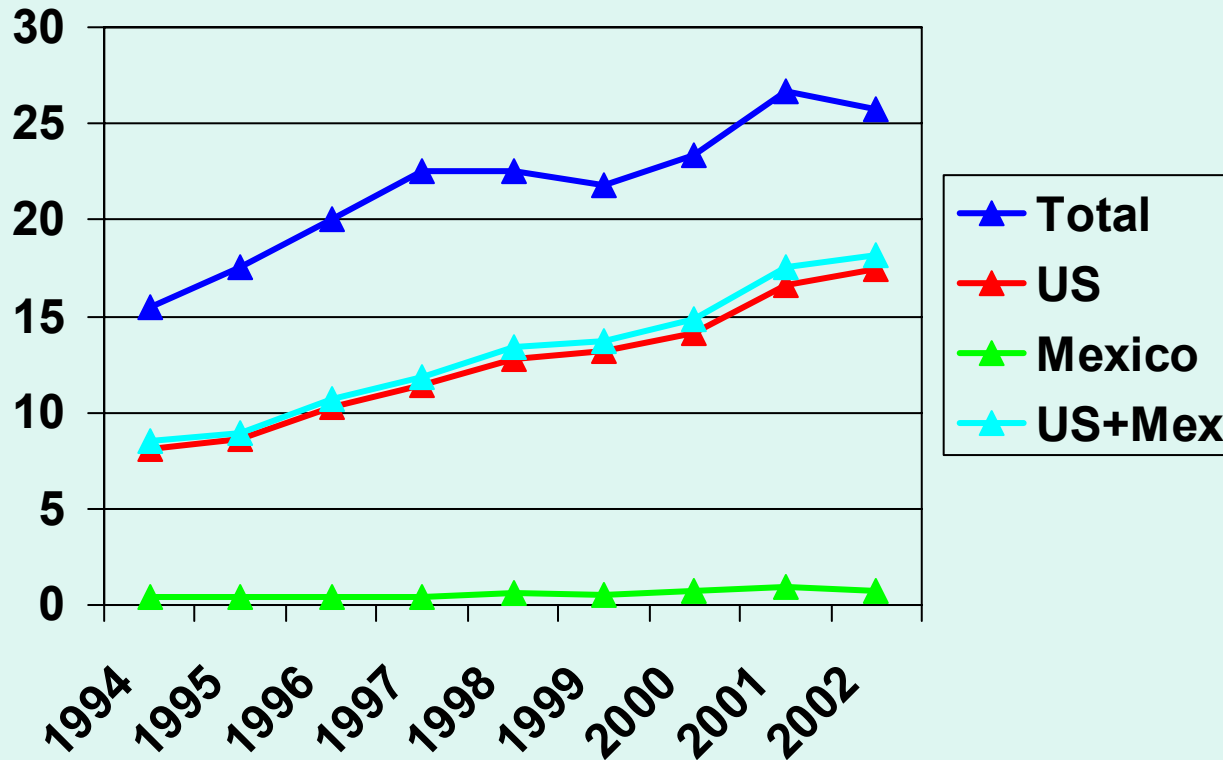
Fraction of Canadian Exports to US and Mexico, 1995-2001



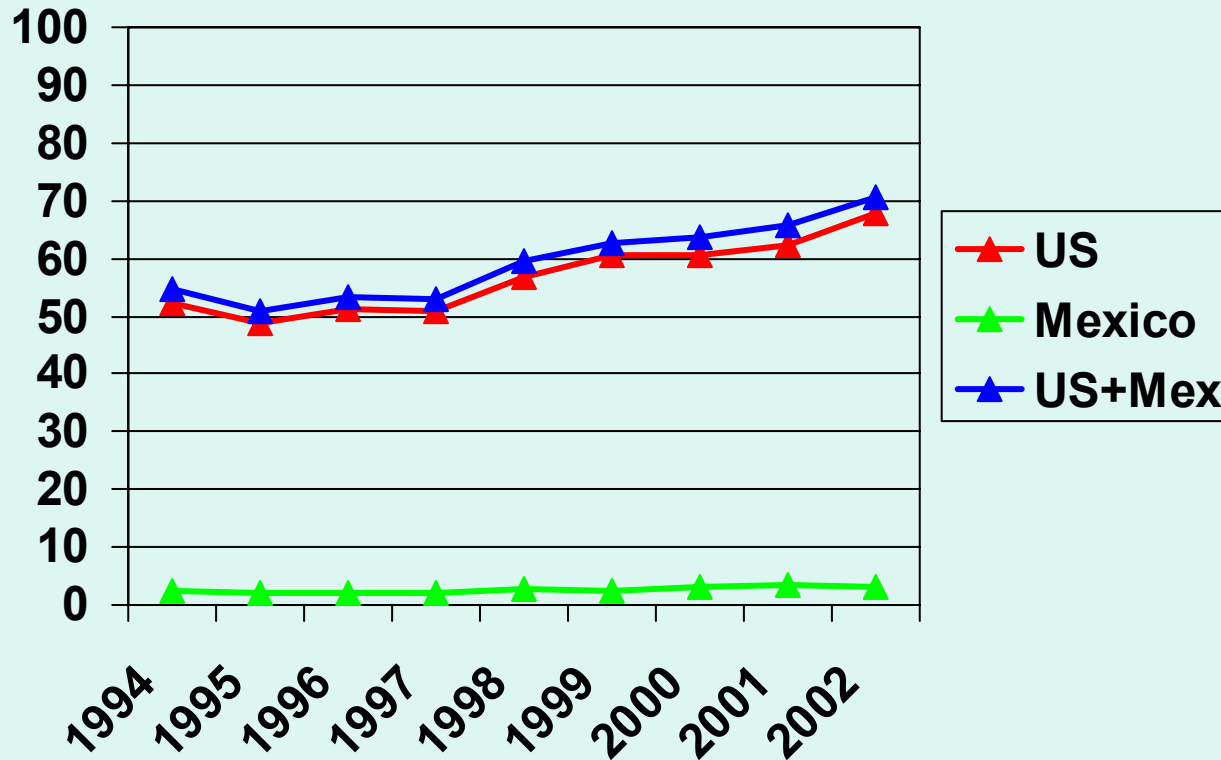
Fraction of US Exports to Canada and Mexico, 1995-2001



Canada's Agri-Food Exports: Total, US, Mexico, 1994-2002, Bil. Can. Dol.



Fraction of Canada's Agri-Food Exports to the US and Mexico.



From Where Would an Attack Originate?

- United States
- NAFTA Partner Country
- Other Country

Terrorism Targets

- Humans
- Food
- Water
- Livestock
- Crops
- Infrastructure

Product Flows

- About 40% of Canada's Shipments to the US Move Via Rail
 - 60% of total at 4 border crossings
- Most of the Rest Via Truck
 - 60% of total at 4 border crossings – 55 % from 3 border crossings in Ontario alone

Product Flows

A Border Slow Down Changes

“Just in Time Delivery”

to

“Give Me Time Delivery”

How Real is a Biosecurity Threat?

- “The US livestock industry...is extremely vulnerable to a host of highly infectious and often contagious biological agents...APHIS...would probably be unable to help eradicate intentional introduction, especially if this were done at multiple sites.”

Terrorism Targets

- The Major Economic Impacts Would Come From Terrorist Attacks on Livestock and Crops
- In Taiwan a Naturally Occurring FMD Outbreak in Swine Only
 - 1/3 of herd destroyed
 - exports to zero
 - price declined 44%
 - revenue declined 64%

Foot and Mouth Disease

- “How To” List on APHIS Web Site
- Easy to Transport
- Highly Infectious
- Major Cost to Eradicate
- No Risk to Human Health

FMD Control Measures

- **Protect Disease Free Zones Through Animal Movement Control**
- Slaughter Infected, Recovered and Susceptible Animals
- Disinfect: Premises, Implements, Trucks, Cars, Clothes
- Destruction of Cadavers, Litter, and Animal Products in Infected Area
- Quarantine

GTAP

- Computable General Equilibrium Model
- Captures Economy Wide Effects
 - Perfect competition
 - Constant returns to scale, CES technology
 - Domestic and imported products are treated as differentiated goods via the Armington assumption
 - Welfare changes measured using equivalent variation
 - 11 Agricultural sectors
 - 9 Countries/regions

Foot and Mouth Disease

- Modeled Via Negative Productivity Shocks in Primary Production (Cattle, Swine, Milk)
 - Labor
 - Capital
- Immobile
 - Land
- Intermediate Inputs (feed) Released

Scenarios – FMD in US Only

- Scenario 1A
 - 5 % reduction in Output of Cattle, Milk and Swine
- Scenario 1B
 - 10 % reduction in Output of Cattle, Milk and Swine
- Scenario 1C
 - 20 % reduction in Output of Cattle, Milk and Swine
- Borders Remain Open!!!!

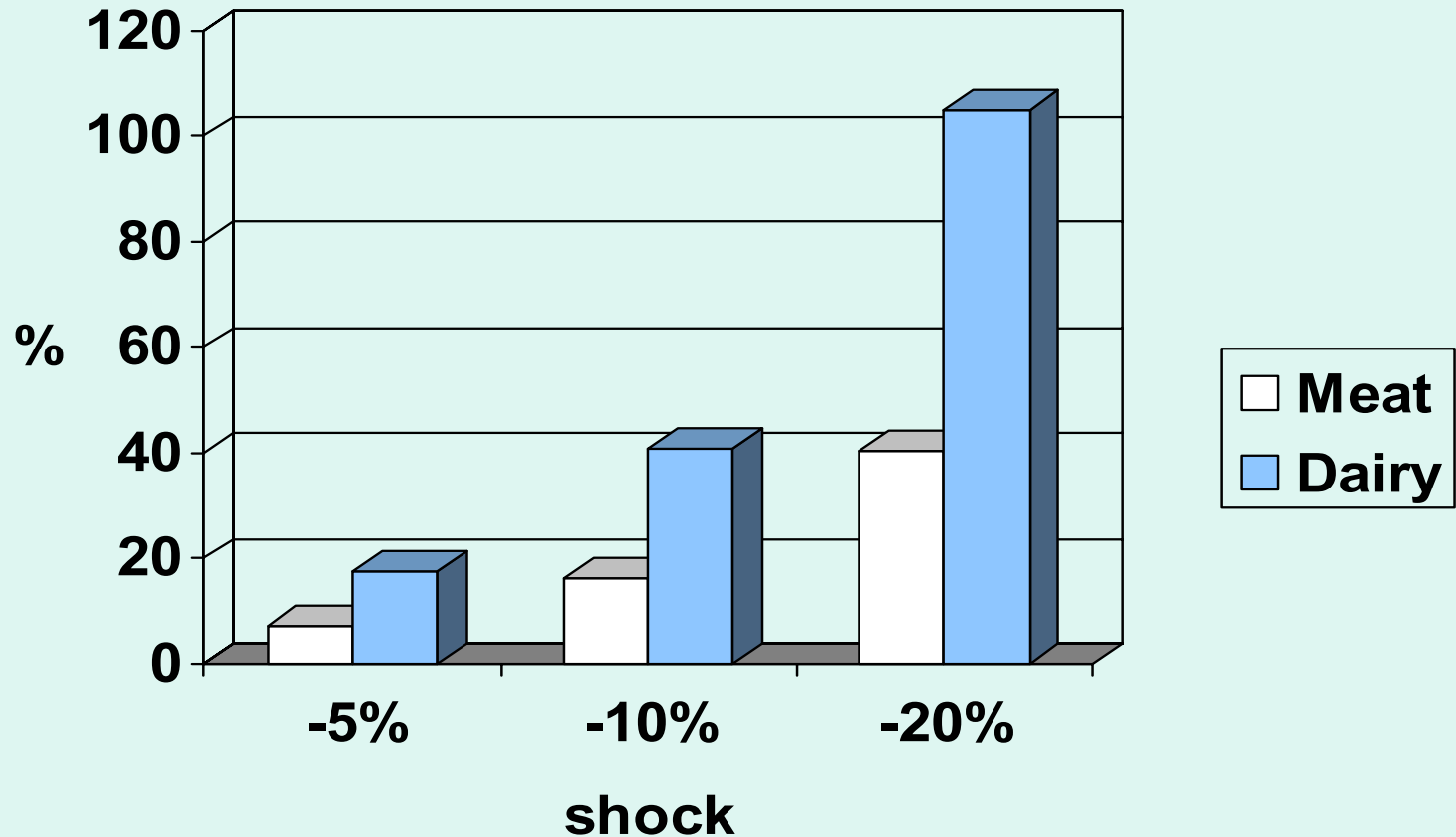
Scenarios – FMD in US Only

- Scenario 2
 - 10 % reduction in Output of Cattle, Milk and Swine
 - A ban on US Exports of Livestock, Swine, Meat and Dairy Products to FMD-Free Countries

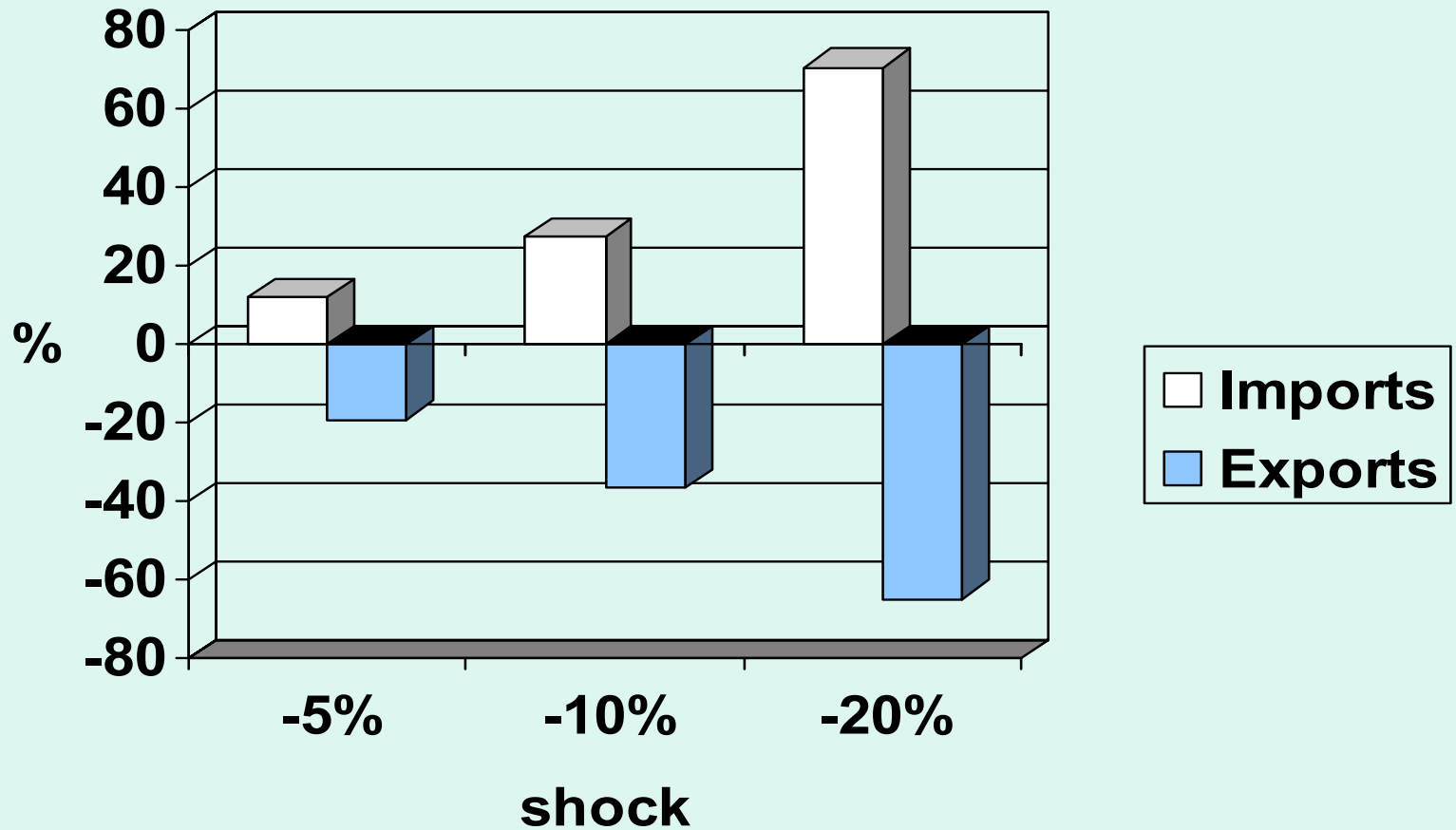
Scenarios – FMD in US Only

- Scenario 3
 - 10 % reduction in Output of Cattle, Milk and Swine
 - A Ban on US Exports of Livestock, Swine, Meat and Dairy Products to FMD-Free Countries
 - Shift in US Domestic Demand Away from Domestic Products and Towards Foreign Products

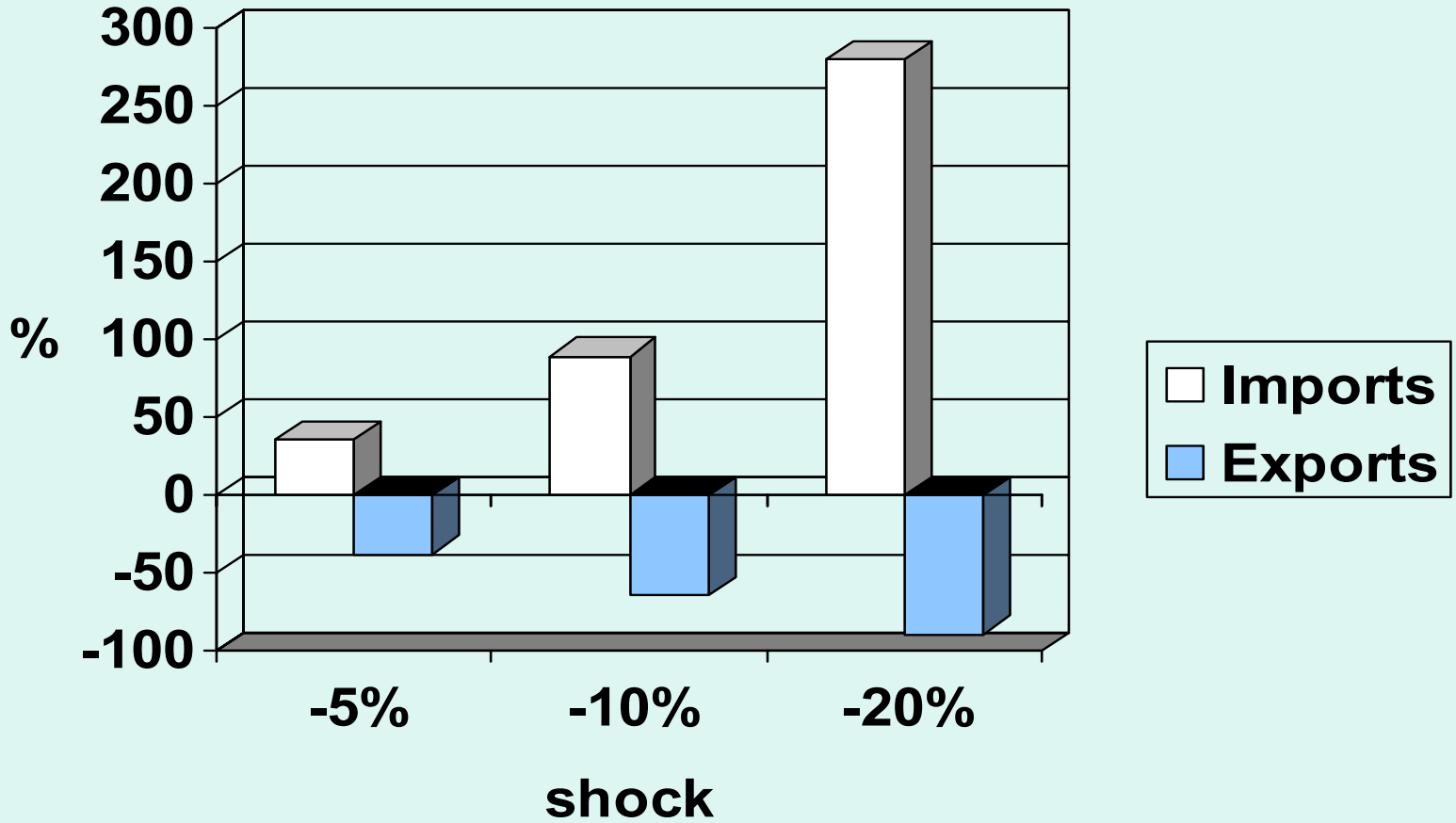
Meat and Dairy Price Effects, US



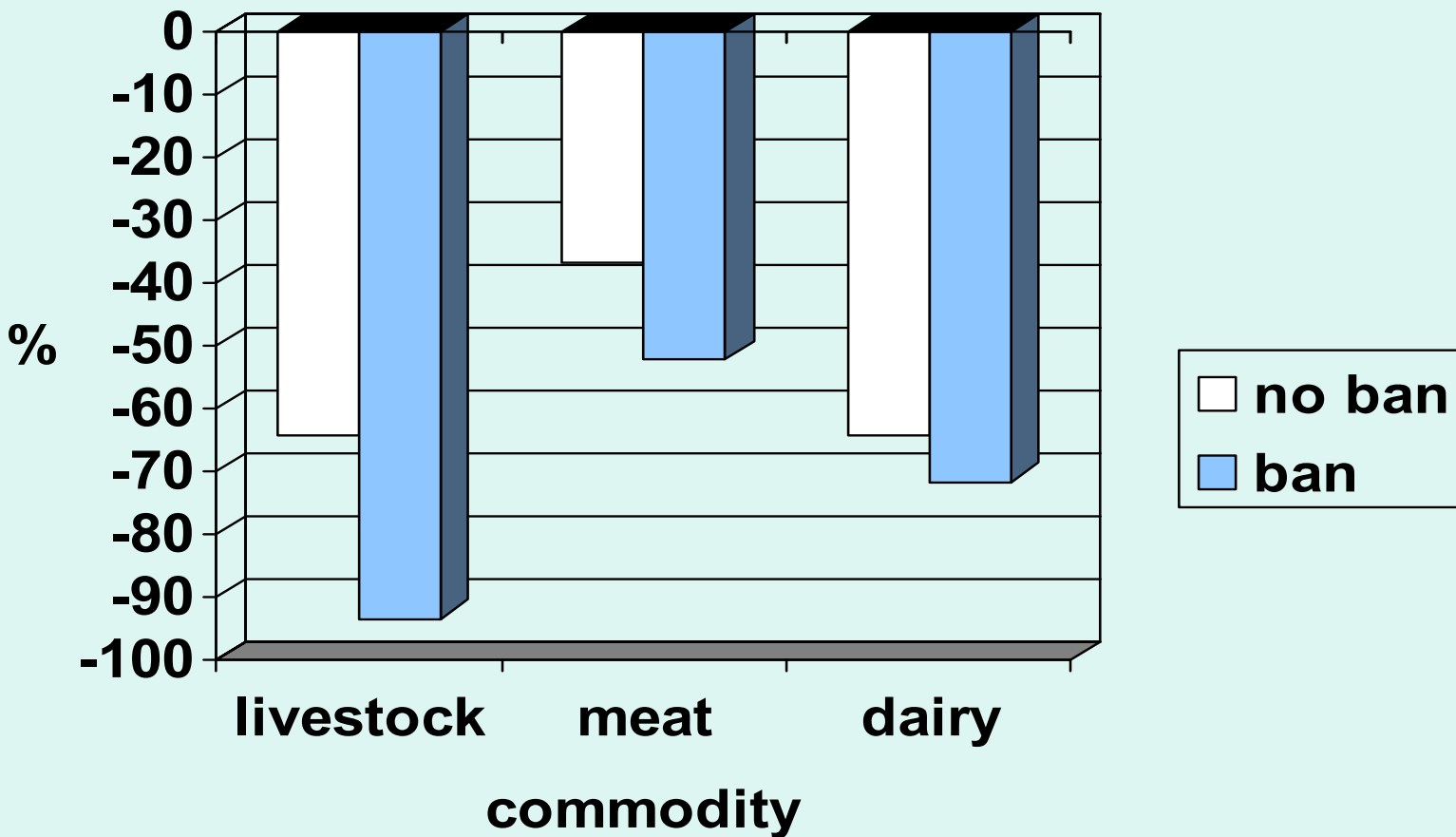
Meat Trade, US



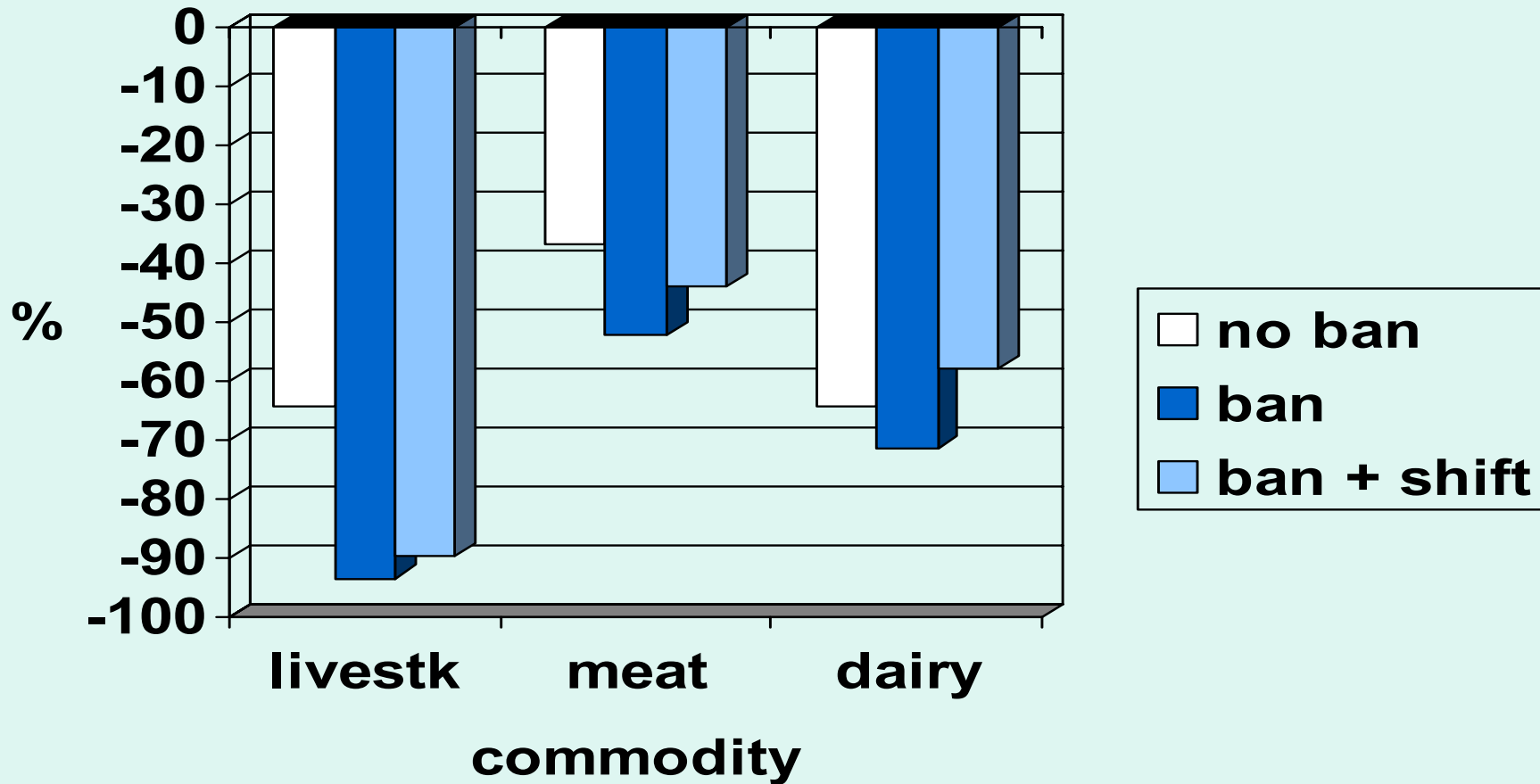
Dairy Trade, US



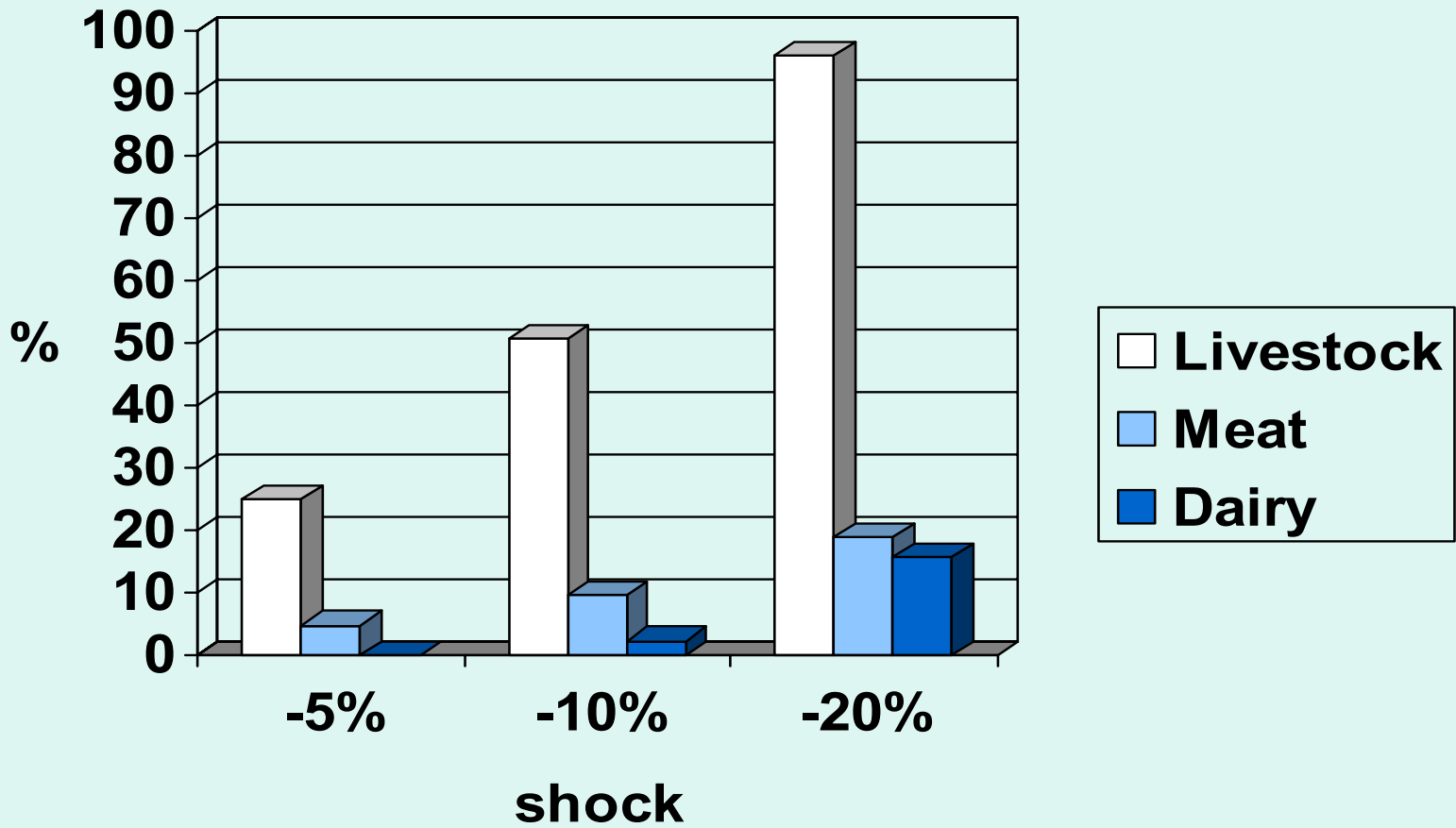
Effect of Adding a Ban on US Exports for -10% Output Shock



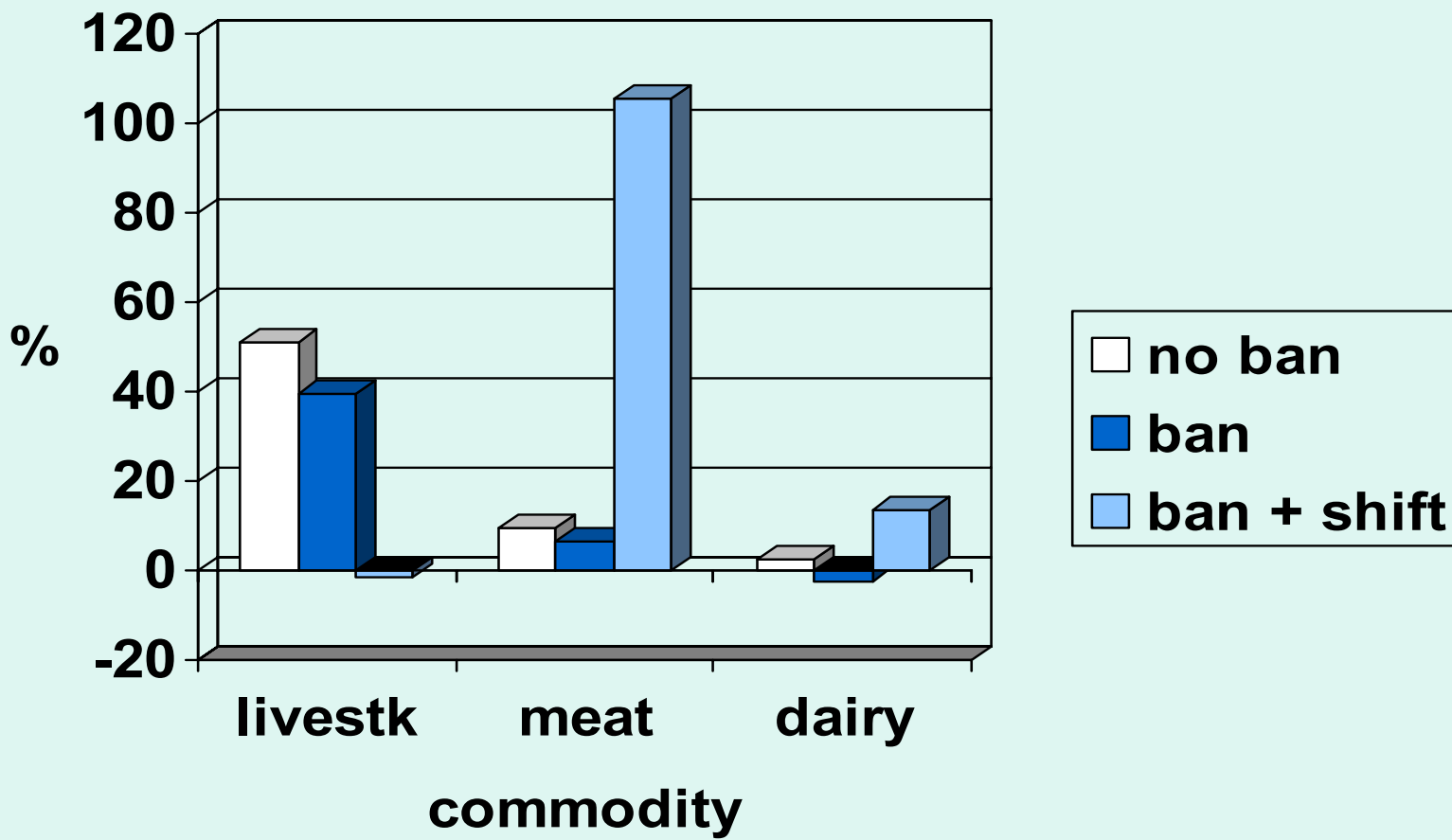
Effect of Adding a Ban and a Demand Shift on US Exports 10% Output Shock



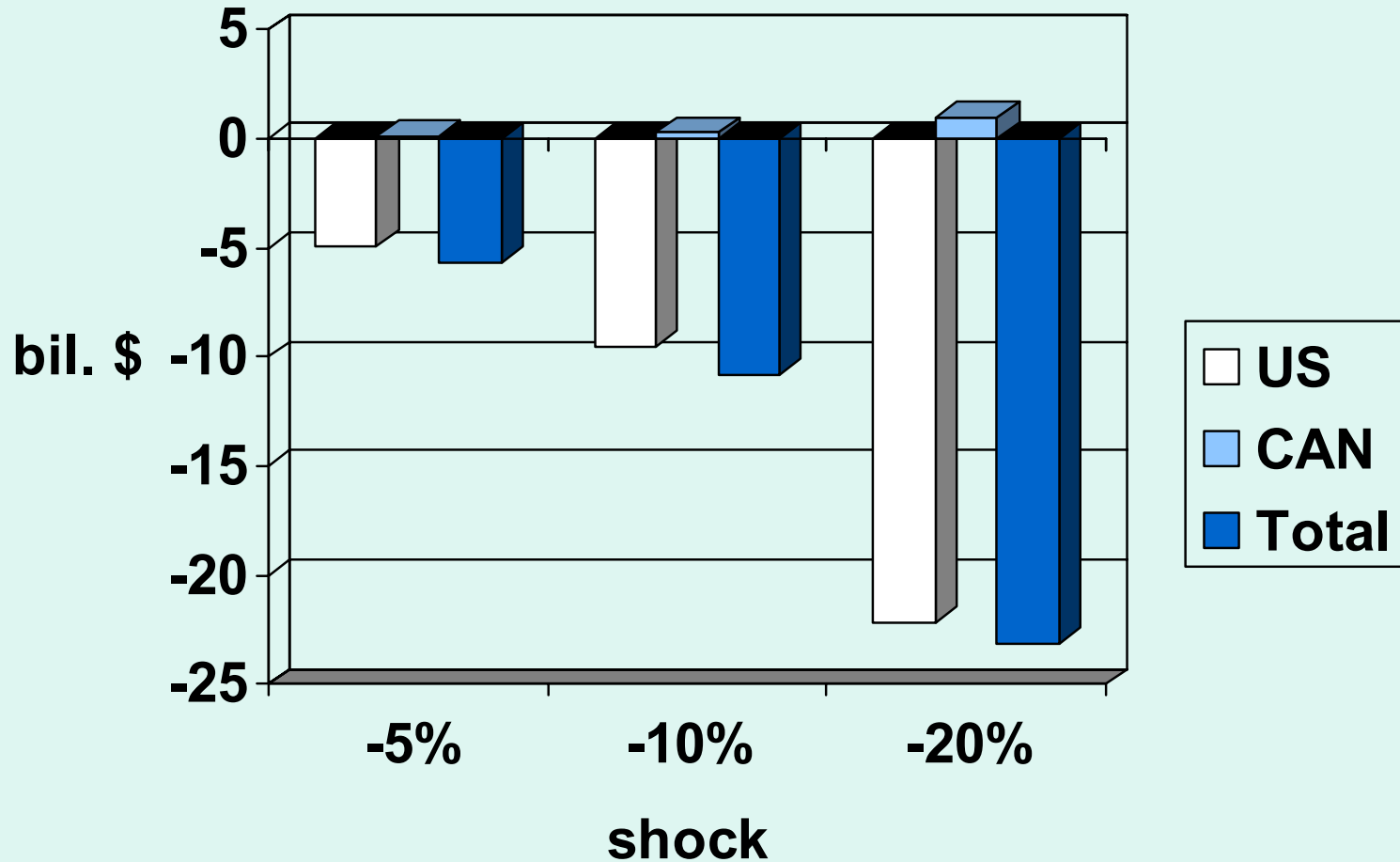
Canada's Exports – No Ban or Demand Shift



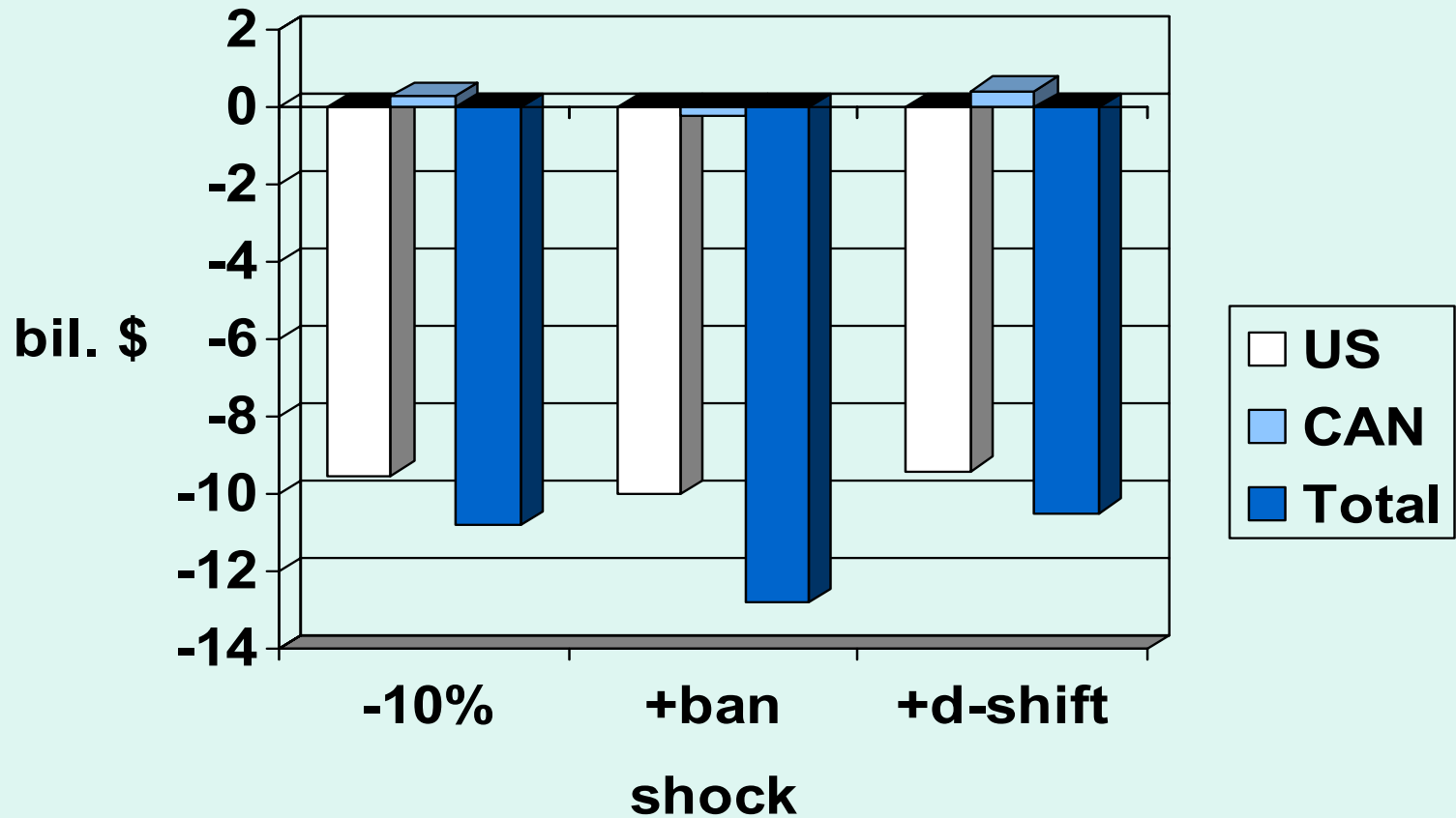
Effect of a Ban and a Demand Shift on Canada's Exports - 10% Output Shock



Welfare Effects



Welfare Effects



Problems

- Cost of Control, Compensation and Eradication Neglected
- Short-Run Effects
- Small Price Increase for Swine

Thanks And Let's Hope There Is Never an Attack!!!

