



# **Modeling Multilateral Trade for the CAR Region**

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# Motivation




- The economic emergence of the PRC, coupled with WTO accession plans for Russia, will dramatically alter trade dynamics in the CAR region.
- Absorption by these two economies will accelerate strongly, especially in primary products.
- The ability of CAR economies to take advantage of these new export opportunities will depend critically on transport efficiency.

# Empirical Capacity for Multilateral Policy Analysis



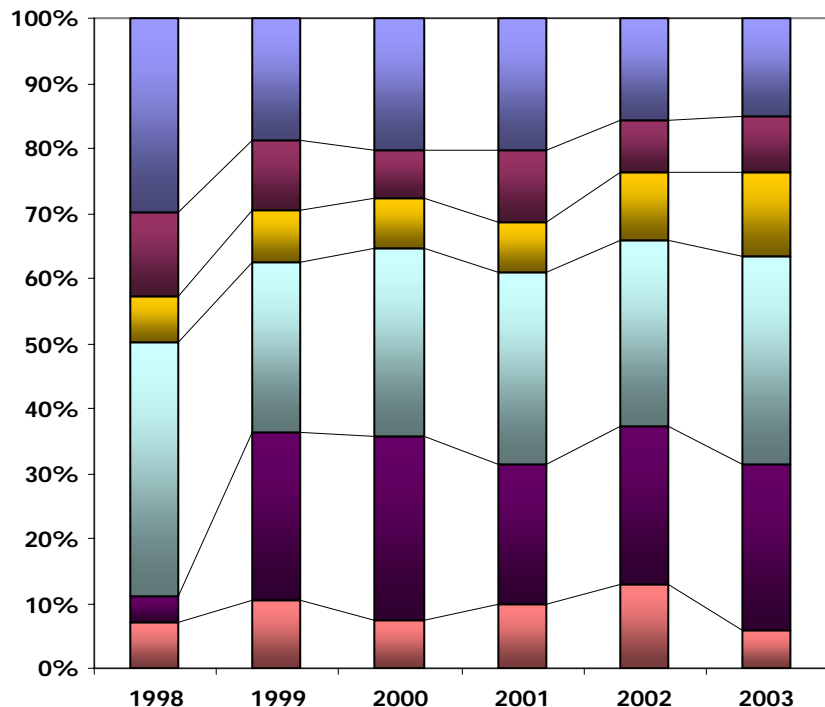
- Emergent regional demand and growth spillovers present new opportunities, but capacity to assess them is limited
- In complex market economies, policy makers relying on intuition alone are unlikely to achieve anything close to optimality
- Going forward, policies based on solid empirical evidence have a better chance of maximizing indirect benefits and limiting adjustment costs



# Overview of Trends in Regional Trade with Examples from Kazakhstan and the PRC

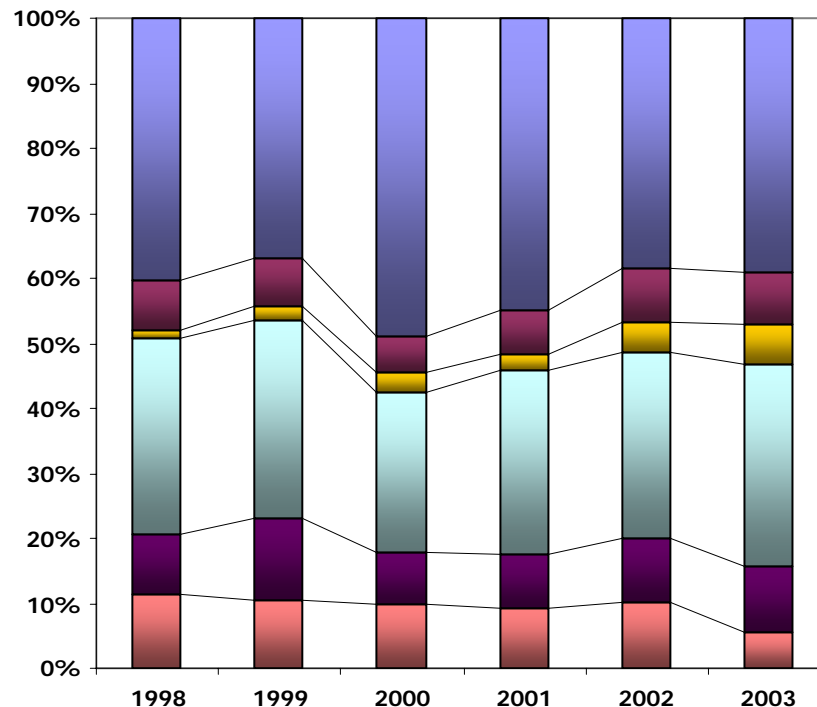
# Global Direction of Trade: Kazakhstan, 1999-2003

## Export Shares



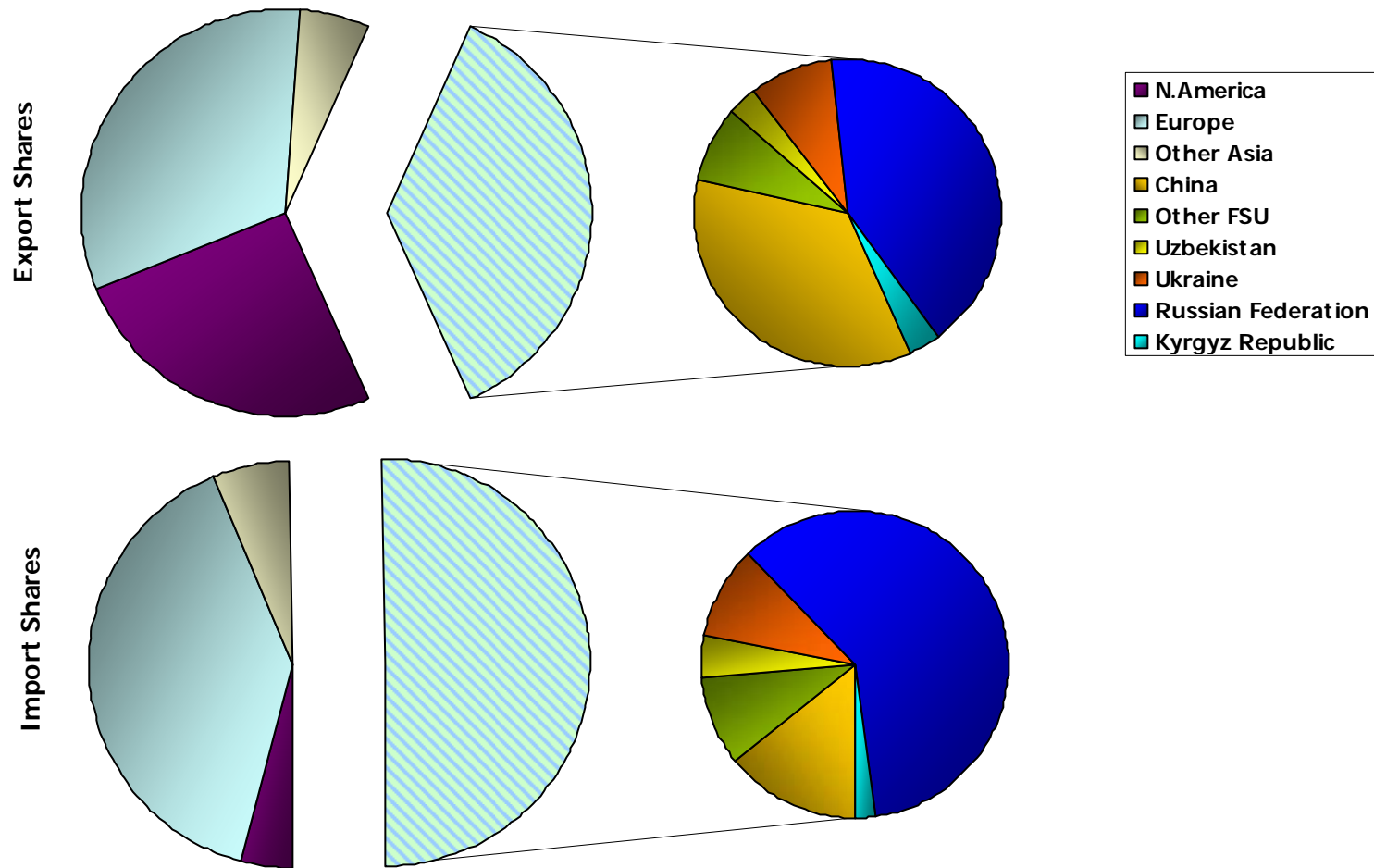
■ ROW 
 ■ Namerica 
 ■ Europe 
 ■ China 
 ■ Other FSU 
 ■ Russian Fed

## Import Shares



■ ROW 
 ■ Namerica 
 ■ Europe 
 ■ China 
 ■ Other FSU 
 ■ Russian Fed

# Regional Direction of Trade: Kazakhstan, 2003



# A Tale of Economic Emergence: The PRC in a Regional Perspective

- Among the regional economies the PRC provides an established case of strong and sustained emergence, from it we can draw lessons for the future of the CAR
- Initial reactions of regional partners, who perceive the PRC as a strong export competitor and magnet for FDI, have been somewhat defensive
- Closer examination reveals a more complex picture, one that presents as many opportunities as threats to Central Asian policy makers
- We survey the PRC's role here to illustrate the importance of anticipating regional growth opportunities



# The PRC's Twin Challenges to the Region

Because of its size and stage of development, the PRC will play two roles in the region with unusual prominence.

1. It will stiffen export competition in a broad spectrum of products
2. The growth of the PRC's economy will make it the region's largest importer, and this absorption will create unprecedented opportunities for Asian exporters

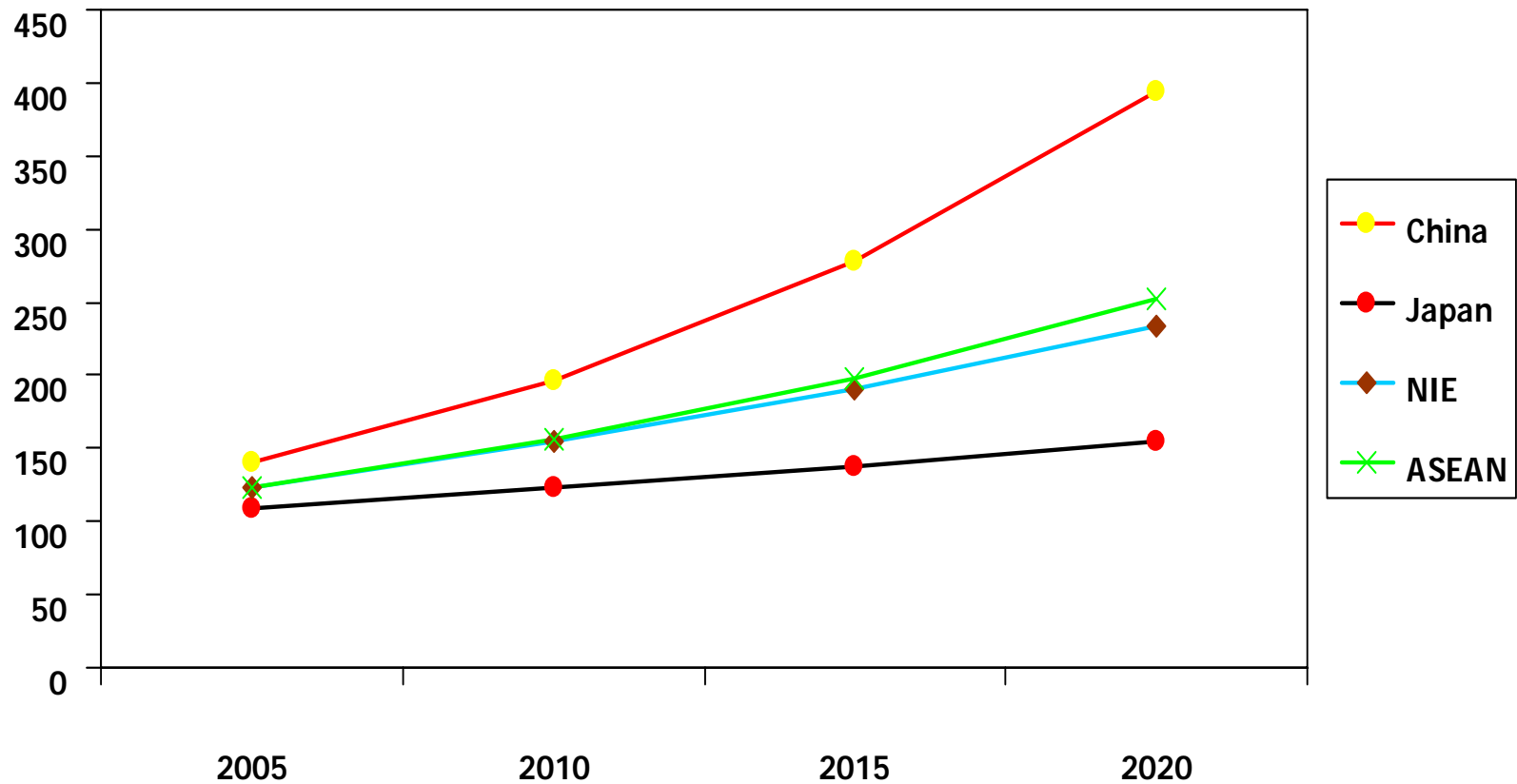
# The PRC's Emergence and the Asian Trade Triangle



- The economic emergence of the PRC has fundamentally changed world trade patterns.
- Using a global forecasting model, we predict that the PRC will become Asia's largest exporter, but also its largest importer.

# Real GDP Growth

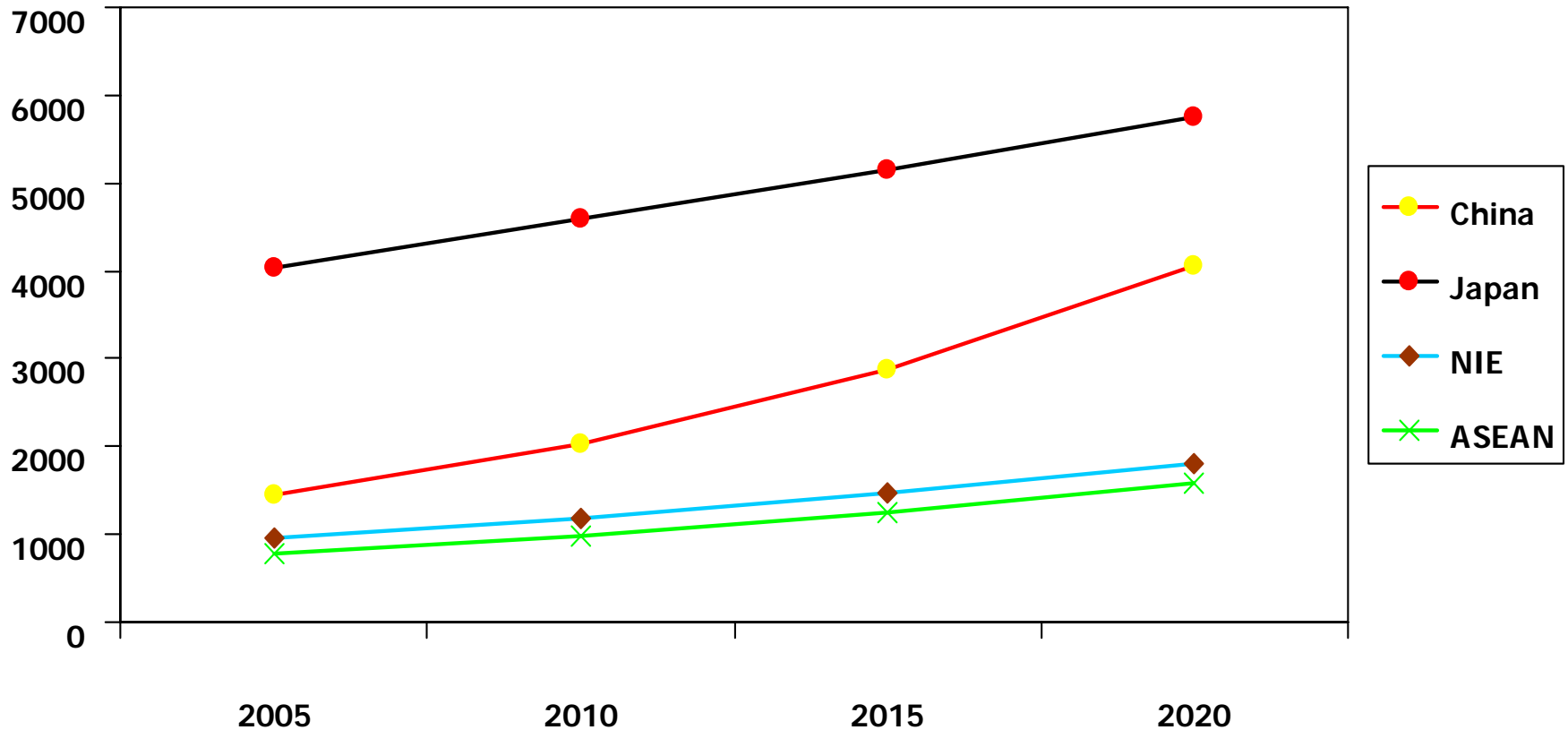
(Normalized to 100 in 2000)



The PRC's growth rate will continue to be above average.

# Real GDP

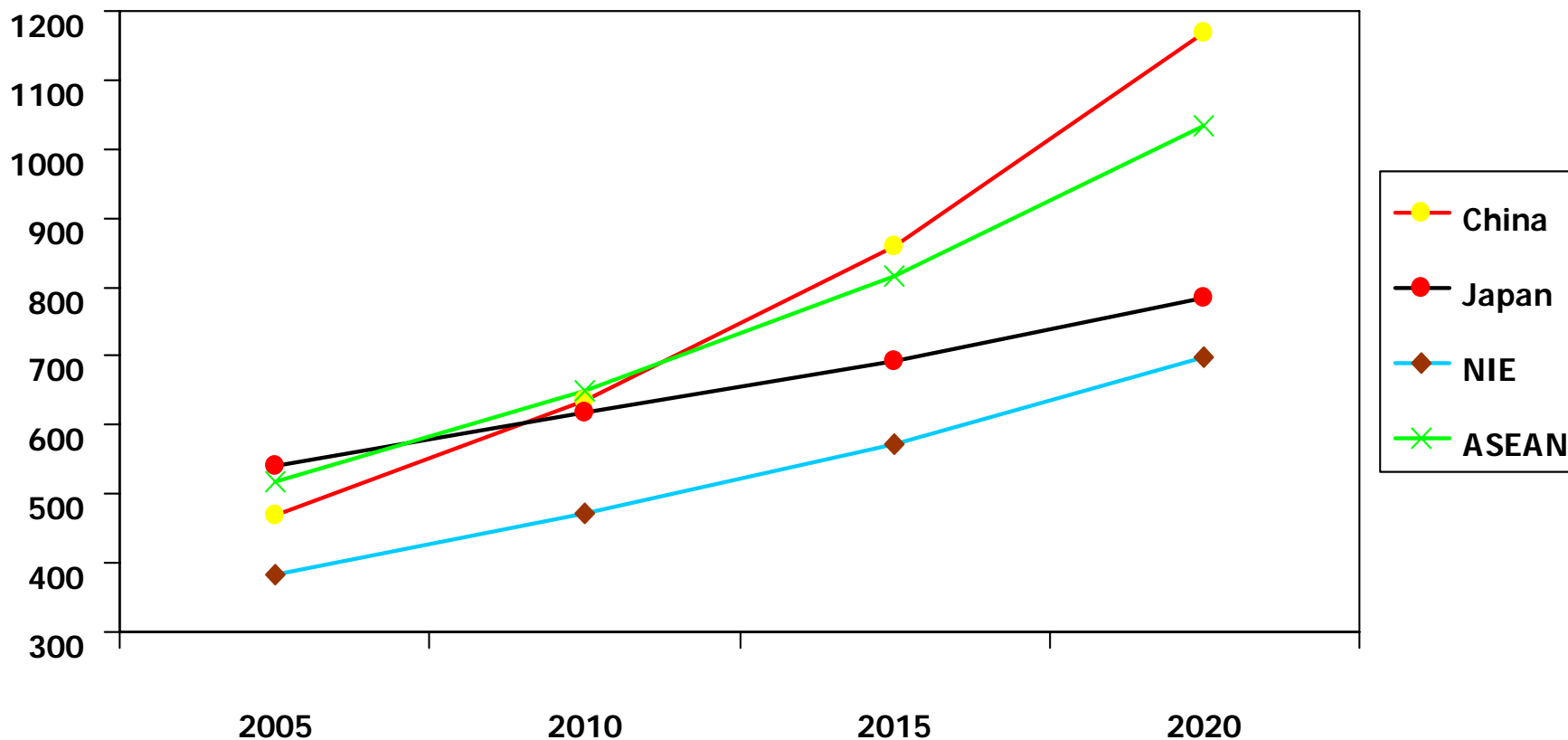
(billions of 1997 USD)



Per capita incomes will rise steadily, changing demand patterns.

# Real Exports

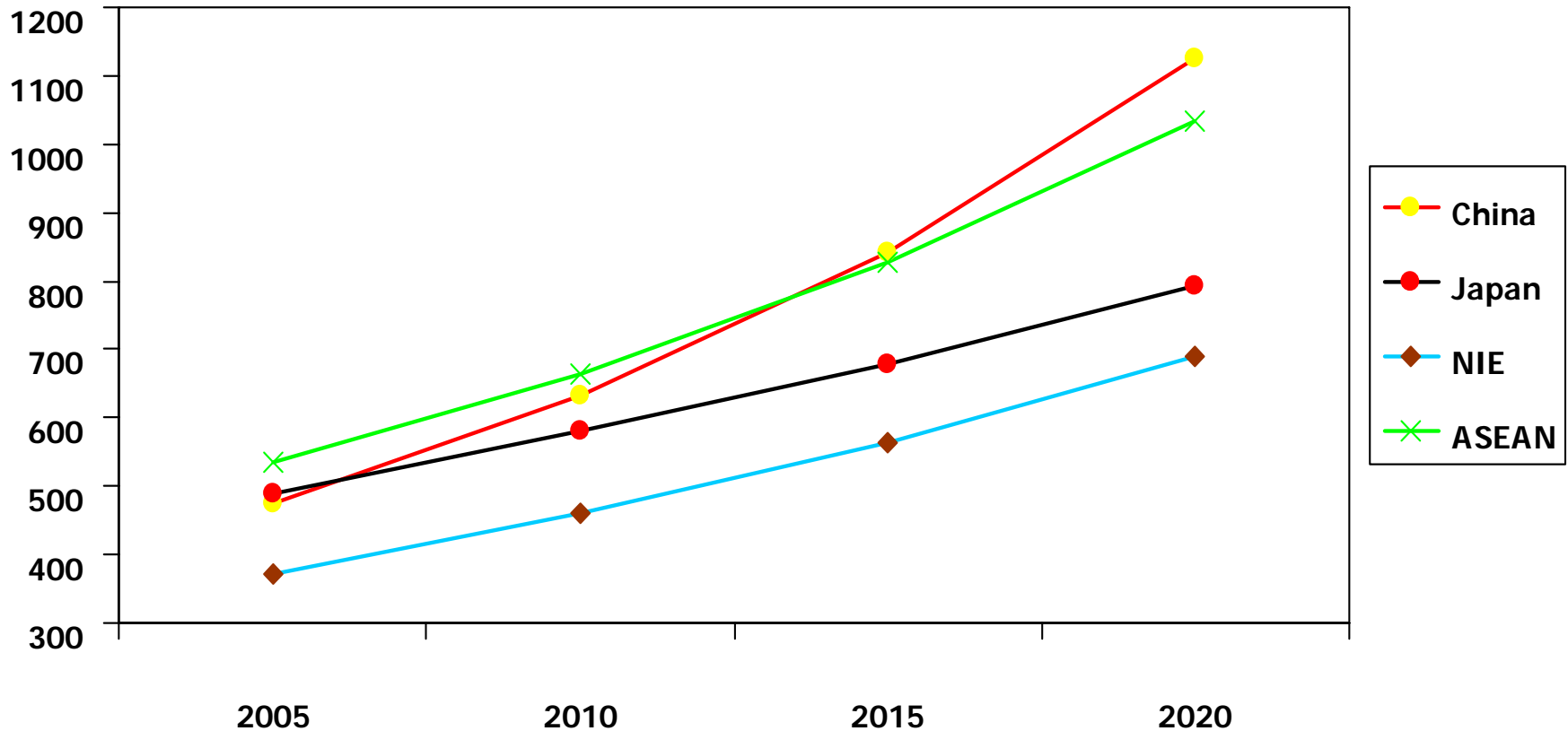
(billions of 1997 USD)



The PRC will be Asia's largest exporter by about 2010,

# Real Imports

(billions of 1997 USD)

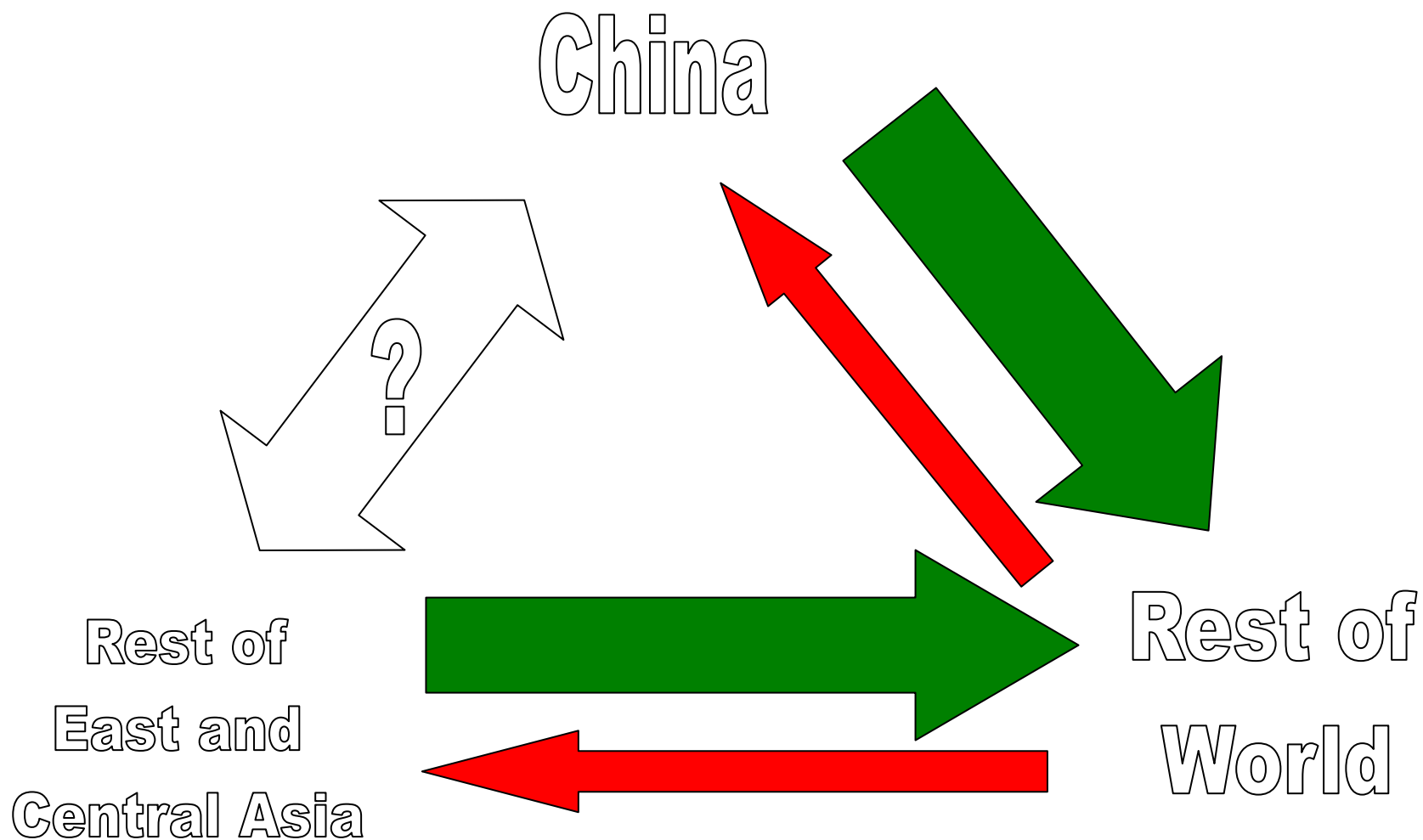


but it's largest importer after 2005. This will be an unprecedented opportunity for neighboring economies

# The Asian Trade Triangle

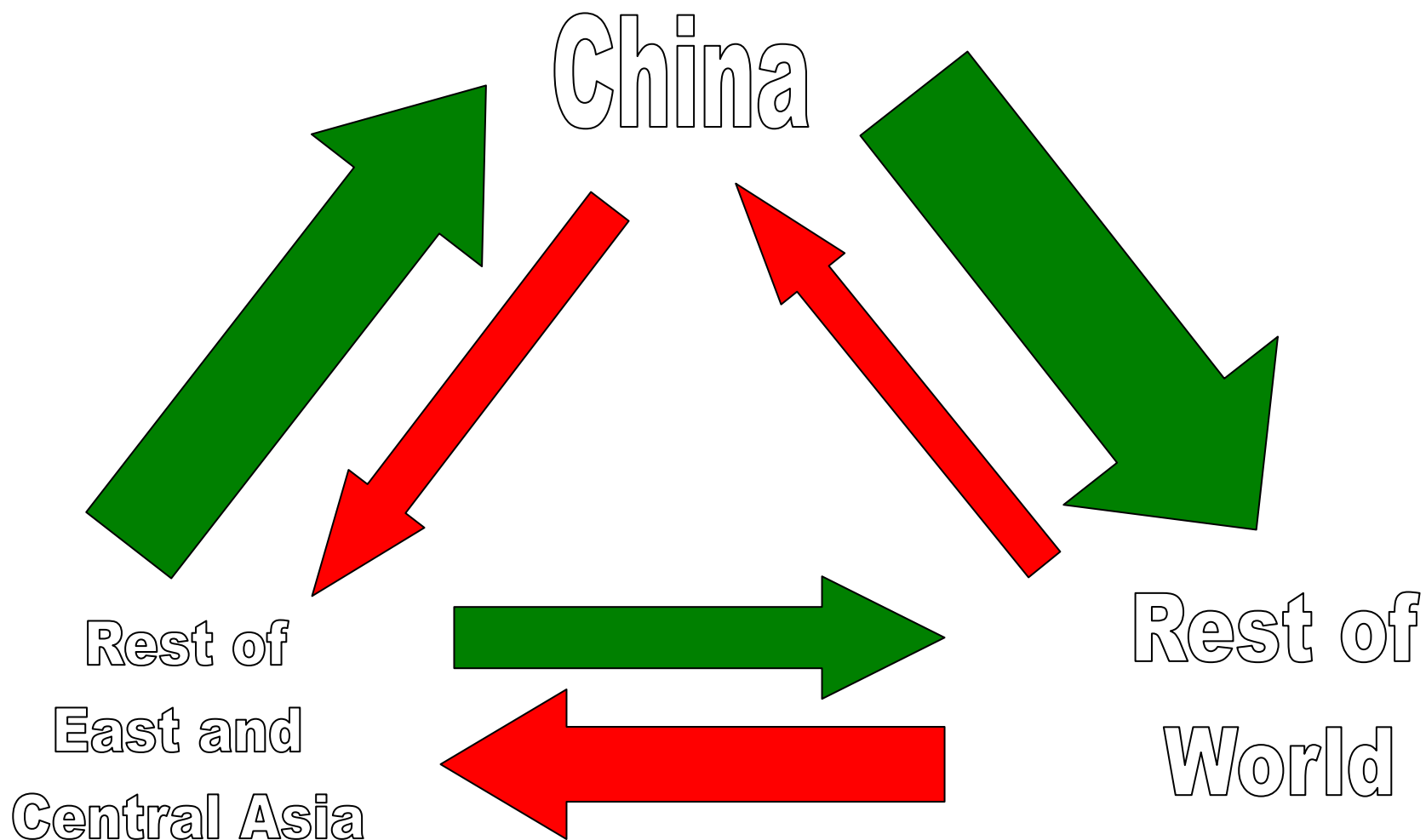
- Our forecasts indicate the emergence of a systematic pattern of triangular trade between the PRC, the Rest of East and Central Asia, and the Rest of the World
- This Trade Triangle reveals that the PRC's export expansion offers significant growth leverage to its neighbors.
- Chinese absorption will emerge to dominate regional demand. Provided Asian economies do not isolate themselves from this process, the net effect of the PRC's growth can be hugely positive.

# Trade Triangle 2000





# Trade Triangle 2020



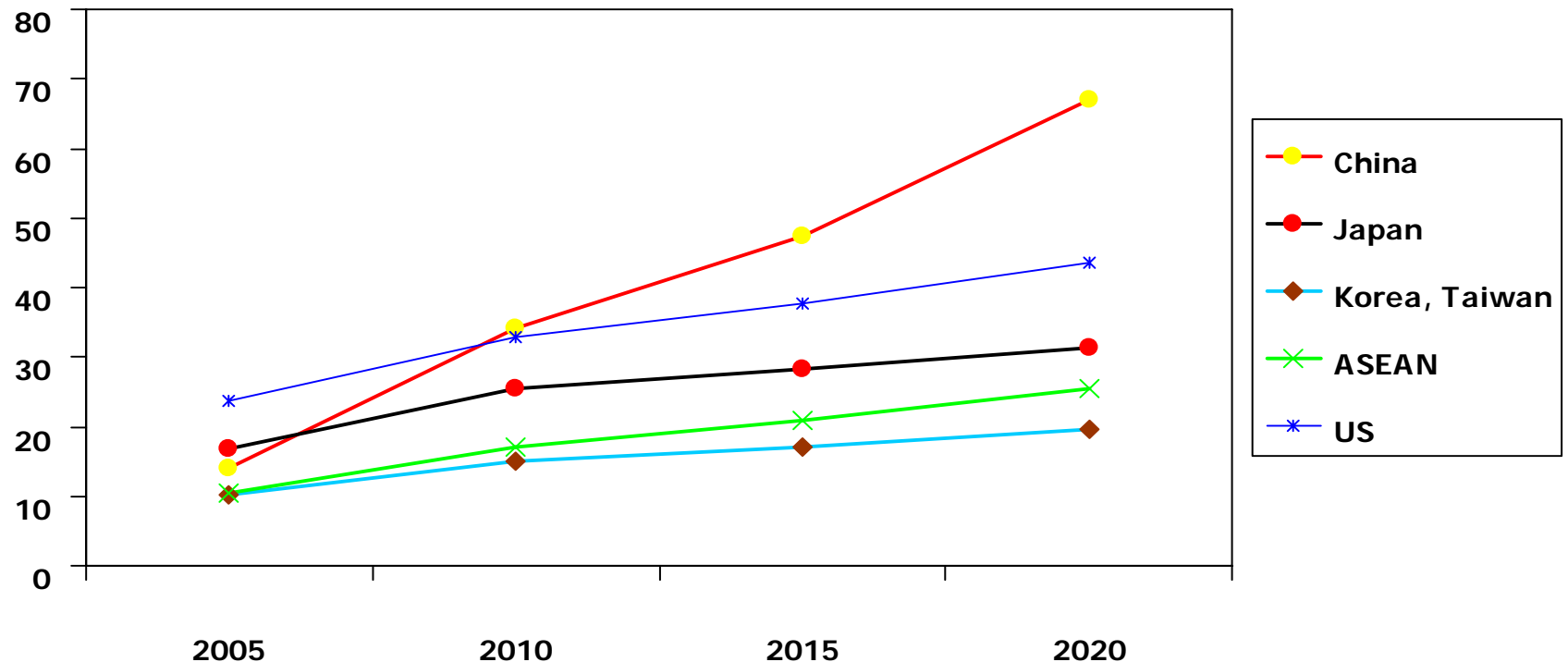
# The PRC and East Asia I

- Head-to-head export global competition with the PRC will continue to be difficult.
- More attention should be given to leveraging opportunities presented by East Asia's fastest growing internal market.
- In these areas, the best strategy for East and Central Asia is to pursue globalism through more comprehensive regionalism.

# The PRC and East Asia II

- This is particularly true in sectors like agriculture, where Chinese competitiveness is limited or the PRC is a net importer.
- Rising incomes in the PRC are increasing the resource-intensity of food consumption (meat, etc.).
- Even if population remained constant over the next 20 years, the PRC would have to double agricultural capacity to meet its changing food requirements.
- More likely will be a massive increase in agricultural imports.

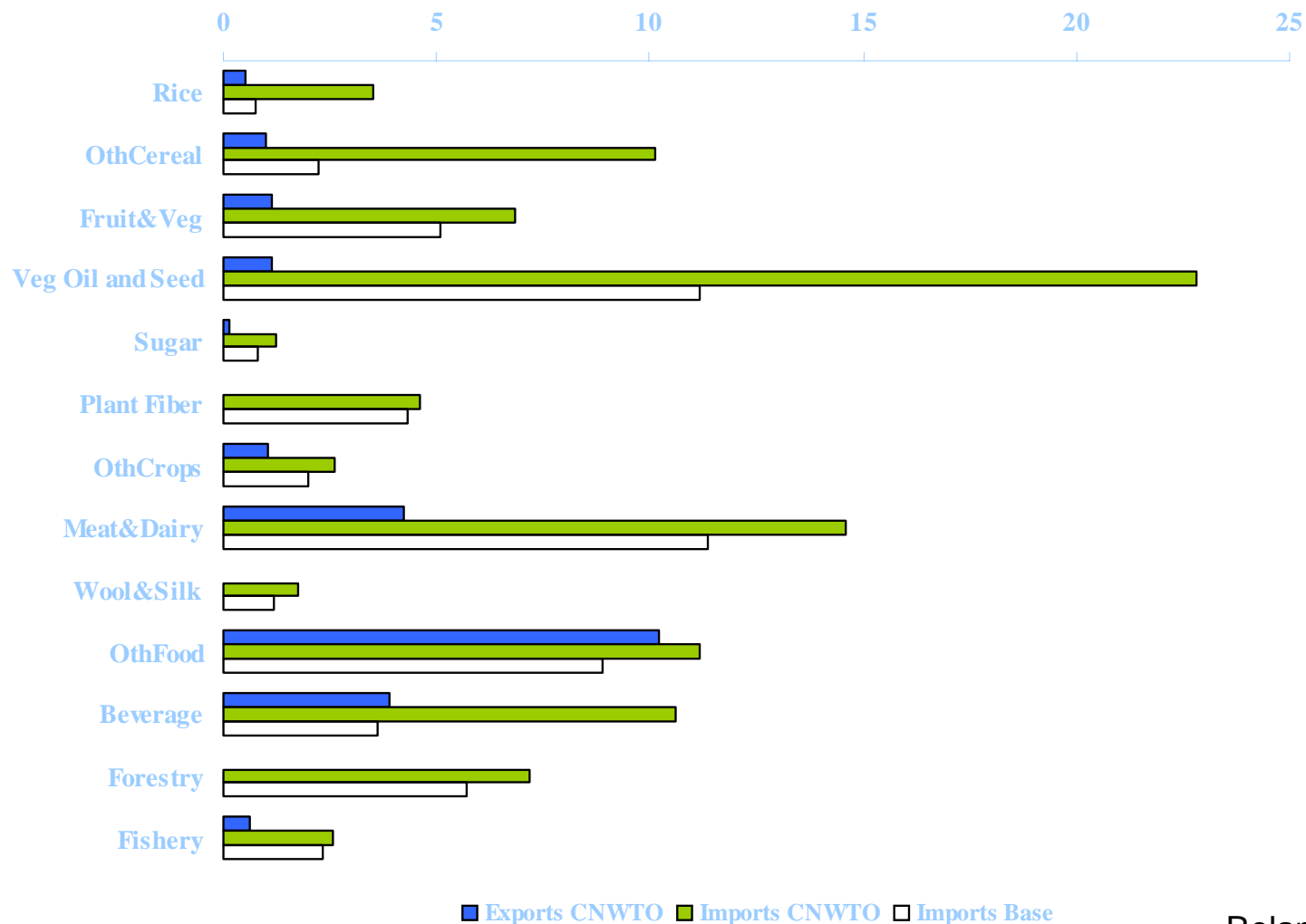
# The PRC will be Asia's Largest Food Importer



Source: Author's estimates.

# The PRC's Emerging Food Gap

(USD 2000 billions in 2020)



# Tipping the Balance from Self-sufficiency to Import Dependence



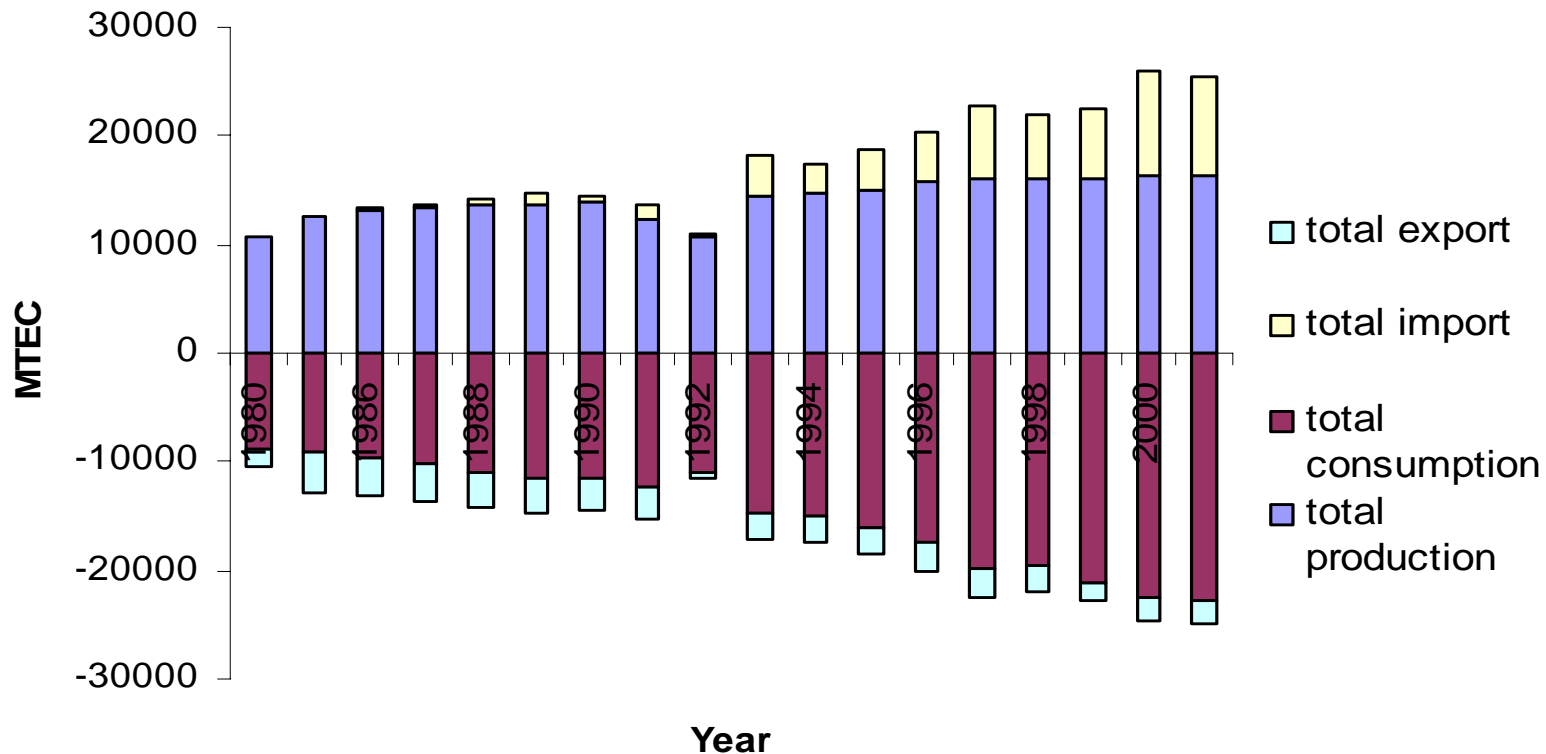
In this context, comparison with the energy sector is particularly revealing.

The PRC does not officially acknowledge significant food import dependence, but is running its first annualized food deficit (\$14B) this year.

In all likelihood, food will follow the example of energy, where The PRC went from small net exports ten years ago to become the world's second largest importer.

# Another Strategic Sector with “Import Surprise”

## Chinese Energy Fuels: Supply and Demand



# The PRC and Resources



- Although it is a large economy, the PRC faces many natural resource constraints.
- As this economy grows and incomes rise, the PRC's import dependence will grow dramatically, particularly in resource-intensive products



# Implications for the CAR

- For the CAR economies, the most important components of this emergent import dependence are energy and food.
- In both absolute and relative terms, trade with the PRC can be to agriculture what trade with the US and EU are to manufacturing.
- Unlike OECD countries, the PRC does not significantly protect its domestic agricultural producers, and its import needs will grow dramatically over the next two decades

# A Multi-county Economic Model for Central Asia



- Using established standards for global trade modeling, we propose to build the first multi-country economic forecasting model for the CAR region
- The formal model exists in prototype form and is now being calibrated to data for Kazakhstan, the Russian Federation, and the PRC
- In a later stage, other individual FSU countries can be added

# History and background

- WALRAS project (OECD 1992)—OECD ag policies
- RUNS project (OECD 1992/93)—Uruguay Round
- LINKAGE V3 (OECD, 1996/99)—Trade and labor
- LINKAGE V5 (WB, 2002)—Post UR and Doha
- ADB Structural Model (2005) – Asian and Growth Trends

# Data



- Version 6 of the Global Trade Analysis Project (GTAP), 2005. This provides the core data for the Russian Federation and Chinese economies.
- Kazakhstan – 2002 Social Accounting Matrix estimated from official sources by the author.
- Trade data – Synthesized from domestic official and multilateral sources
- Other – Trade and transport data are desperately needed

# Sectoral concordance

## Primary Products

- 1 Agriculture, hunting and forestry
- 2 Fishing and fish-breeding
- 3 Coal, oil and gas production
- 4 Extraction of metal ores
- 5 Other mining

## Industry

- 6 Production of food and tobacco goods
- 7 Textiles and Apparel
- 8 Timber production and woodwork
- 9 Paper, publishing, and printing
- 10 Coke, oil refining, chemical, rubber and plastic
- 11 Other non-metallic mineral products
- 12 Metallurgy
- 13 Metal products
- 14 Production of machinery and equipment
- 15 Other industries

## Services

- 16 Electric power
- 17 Gas
- 18 Steam and hot water provision
- 19 Water
- 20 Construction
- 21 Wholesale trade
- 22 Retail trade
- 23 Maintenance and repair
- 24 Hotels and restaurants
- 25 Transportation
- 26 Post and communications
- 27 Financial activities
- 28 Real Estate
- 29 Public administration
- 30 Education
- 31 Health and social services
- 32 Services
- 33 Social, Sport, Culture
- 34 Individual services

# Model structure I—Overview

- Multi-sectoral and multi-regional
- Constant-returns-to-scale and perfect competition
- (Recursive) dynamic
- Single representative household per region
- Government and investment activities
- Linked bilateral trade flows.

# Model structure II—Production

- Three production archetypes:
  - Crops (extensive vs. intensive)
  - Livestock (range-fed vs. ranch-fed)
  - Other (standard capital-labor substitution)
- Crop sectors include land, energy and agricultural chemicals as substitutable inputs
- Livestock includes land and feed as substitutable inputs
- Energy is a substitutable input in other sectors
- Fossil fuels also rely on sector-specific resource.

# Model structure III—Factor markets

- Labor is perfectly mobile across sectors and there is a single market-clearing wage rate.
- ‘New’ capital is mobile across sectors, installed capital is partially mobile.
- All factor income accrues to single representative household
- Extended linear expenditure system for consumer demand



# Model structure IV—Imports

- Aggregate demand is the sum of demand across industries, households, government and investment.
- Aggregate demand is composed of domestic and imported goods.
- Dual nested CES structure. Top nest allocates aggregate demand between domestic goods and an aggregate import bundle.
- Second nest allocates aggregate import demand across regions of origin.

# Model structure V—Bilateral trade

- Output is modeled symmetrically with a dual nested CET structure. (Standard model assumes infinite transformation.)
- A single domestic price equilibrates demand and supply of the domestic good.
- Each trade node clears with a market-clearing price. The model therefore has  $(N \times R)(R+1)$  equilibrium goods prices.

# Model structure VI—Trade wedges

- Each traded commodity has four prices—pre-FOB (export subsidy excluded), FOB, CIF, and post-CIF (tariff inclusive).
- FOB/CIF wedge modeled using international trade and transport services.
- Model also includes trade friction parameter (so-called iceberg parameter).

# Model structure VII—Closure

- Taxes on intermediate inputs and final demand, factors of production, output, trade, and households.
- All taxes are exogenous save household direct taxes. The latter are endogenous to hit a given fiscal balance.
- Investment is savings (private, public and foreign) driven.
- Net foreign savings are exogenous.
- Model numéraire is OECD manufactured export price index.

# Model structure VIII—Dynamics

- Labor force and population growth are exogenous.
- Capital stock is driven by past investments (and depreciation).
- Productivity is calibrated in baseline to achieve a GDP growth target.
- Productivity is typically exogenous (i.e. fixed) in policy scenarios, though some scenarios link sectoral productivity to export/output ratio.

# Model structure IX—Variations

- Segmented labor markets (e.g. rural vs. urban) with or without migration.
- Minimum wage (with endogenous regime switch).
- Tariff rate quotas (TRQs).
- International capital mobility (driven by changes in relative rates of return).
- Increasing returns to scale with contestable markets