

Texas Comparative Advantage and Manufacturing Exports

Ten-Gallon Economy: Sizing Up Texas' Growth

November 7, 2014

Jesus Cañas, Luis Torres and Christina English

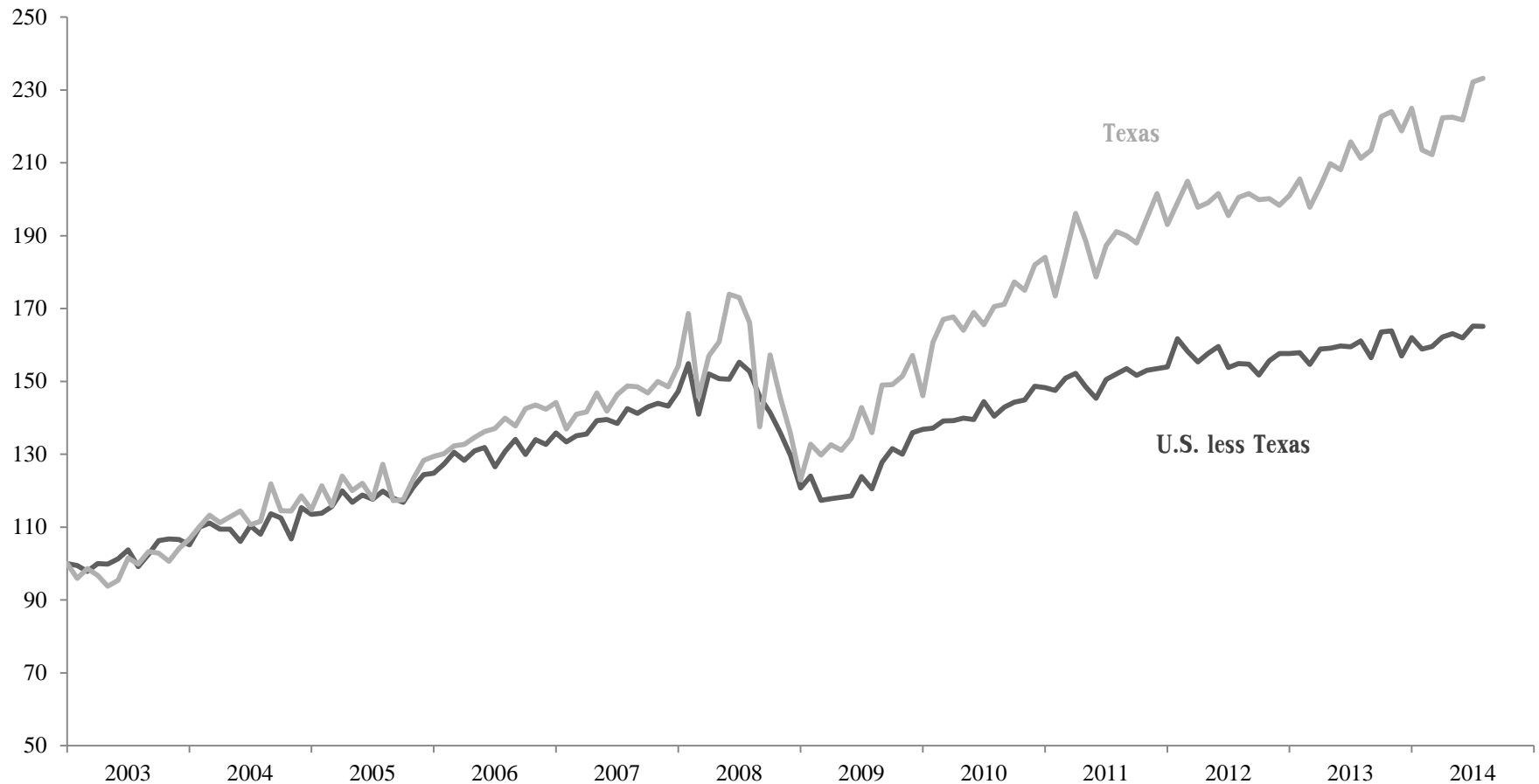
The views expressed in this presentation are strictly those of the author and do not necessarily reflect the positions of the Federal Reserve Bank of Dallas or of the Federal Reserve System. Any secondary distribution of this material is strictly prohibited. May be quoted with appropriate attribution to the author.

Motivation for paper

- Texas exports more goods than any other US state
- 2 of 10 goods that the US exports come from Texas
- In 2013: exports = \$280 billion; about 20 gross state product
 - Has Texas comparative advantage changed?
 - What do we sell to the world?
 - Who are Texas principal competitors?
 - Countries
 - US states
 - What is the role of productivity in export performance?

Texas exports growing faster than the nation since the recession

Index, Jan.'03=100, Real \$, SA



NOTE: Last data point is August.

SOURCES: U.S. Census Bureau; WISERTrade.

Texas a major player in world trade

(Share of total exports)

	2012
Total Manufacturing Exports	1.82
1 Petroleum & Coal Products	6.05
2 Chemicals	2.71
3 Machinery, Except Electrical	2.11
4 Computer & Electronic Products	2.02
5 Fabricated Metal Products, Nesoi	1.89
6 Electrical Equipment, Appliances & Components	1.50
7 Transportation Equipment	1.31
8 Plastics & Rubber Products	1.13
9 Printed Matter And Related Products	0.97
10 Paper	0.87
11 Textiles & Fabrics	0.79
12 Miscellaneous Manufactured Commodities	0.75
13 Primary Metal Mfg	0.72
14 Food and Kindred Products	0.69
15 Nonmetallic Mineral Products	0.47
16 Furniture & Fixtures	0.35
17 Beverages & Tobacco Products	0.33
18 Leather & Allied Products	0.33
19 Textile Mill Products	0.26
20 Wood Products	0.20
21 Apparel & Accessories	0.12

Revealed Comparative Advantage (RCA)

- A country has RCA in a product/sector if it exports more than the share of total world trade that the product/sector represents.
- $RCA > 1$ indicates a country exports more than the world's average
- $RCA > 1$ implies a country is more efficient in producing such product/sector

Methodology for RCA

$$RCA_i^{Region} = \left(\frac{X_i^{Region} / \sum_{i=1}^n X_i^{Region}}{X_i^{World} / \sum_{i=1}^n X_i^{World}} \right)$$

Where:

RCA_i^{Region} = State or country's revealed comparative advantage in NAICS i

X_i^{Region} = value of state or country's exports of NAICS i

X_i^{World} = value of world exports of NAICS i

What do we export to the world?

Are we competitive?

NAICS code	NAICS Description	RCA (avg) 2012-2002	Share 2012
3241	Petroleum & Coal Products	2.7	22.7
3251	Basic Chemicals	2.8	10.5
3252	Resin, Syn Rubber, Artf & Syn Fibers/fil	3.0	5.9
3344	Semiconductors & Other Electronic Components	1.6	5.6
3341	Computer Equipment	1.3	5.1
3363	Motor Vehicle Parts	1.4	4.7
3331	Ag & Construction & Machinery	3.6	4.6
3342	Communications Equipment	1.3	3.6
3339	Other General Purpose Machinery	1.0	2.9
3345	Navigational/measuring/medical/control Instrument	1.0	2.6
3361	Motor Vehicles	0.4	2.5
3329	Other Fabricated Metal Products	1.3	2.5
3364	Aerospace Products & Parts	1.0	2.3
3336	Engines, Turbines & Power Transmsn Equip	0.9	2.0
3359	Electrical Equipment & Components, Nesoi	1.3	1.8

What do we export to the world?

Are we competitive?

NAICS code	NAICS Description	RCA (avg) 2012-2002	Share 2012
3241	Petroleum & Coal Products	2.7	22.7
3251	Basic Chemicals	2.8	10.5
3252	Resin, Syn Rubber, Artf & Syn Fibers/fil	3.0	5.9
3344	Semiconductors & Other Electronic Components	1.6	5.6
3341	Computer Equipment	1.3	5.1
3363	Motor Vehicle Parts	1.4	4.7
3331	Ag & Construction & Machinery	3.6	4.6
3342	Communications Equipment	1.3	3.6
3339	Other General Purpose Machinery	1.0	2.9
3345	Navigational/measuring/medical/control Instrument	1.0	2.6
3361	Motor Vehicles	0.4	2.5
3329	Other Fabricated Metal Products	1.3	2.5
3364	Aerospace Products & Parts	1.0	2.3
3336	Engines, Turbines & Power Transmsn Equip	0.9	2.0
3359	Electrical Equipment & Components, Nesoi	1.3	1.8

What do we export to the world?

Are we competitive?

NAICS code	NAICS Description	RCA (avg) 2012-2002	Share 2012
3241	Petroleum & Coal Products	2.7	22.7
3251	Basic Chemicals	2.8	10.5
3252	Resin, Syn Rubber, Artf & Syn Fibers/fil	3.0	5.9
3344	Semiconductors & Other Electronic Components	1.6	5.6
3341	Computer Equipment	1.3	5.1
3363	Motor Vehicle Parts	1.4	4.7
3331	Ag & Construction & Machinery	3.6	4.6
3342	Communications Equipment	1.3	3.6
3339	Other General Purpose Machinery	1.0	2.9
3345	Navigational/measuring/medical/control Instrument	1.0	2.6
3361	Motor Vehicles	0.4	2.5
3329	Other Fabricated Metal Products	1.3	2.5
3364	Aerospace Products & Parts	1.0	2.3
3336	Engines, Turbines & Power Transmsn Equip	0.9	2.0
3359	Electrical Equipment & Components, Nesoi	1.3	1.8

What do we export to the world?

Are we competitive?

NAICS code	NAICS Description	RCA (avg) 2012-2002	Share 2012
3241	Petroleum & Coal Products	2.7	22.7
3251	Basic Chemicals	2.8	10.5
3252	Resin, Syn Rubber, Artf & Syn Fibers/fil	3.0	5.9
3344	Semiconductors & Other Electronic Components	1.6	5.6
3341	Computer Equipment	1.3	5.1
3363	Motor Vehicle Parts	1.4	4.7
3331	Ag & Construction & Machinery	3.6	4.6
3342	Communications Equipment	1.3	3.6
3339	Other General Purpose Machinery	1.0	2.9
3345	Navigational/measuring/medical/control Instrument	1.0	2.6
3361	Motor Vehicles	0.4	2.5
3329	Other Fabricated Metal Products	1.3	2.5
3364	Aerospace Products & Parts	1.0	2.3
3336	Engines, Turbines & Power Transmsn Equip	0.9	2.0
3359	Electrical Equipment & Components, Nesoi	1.3	1.8

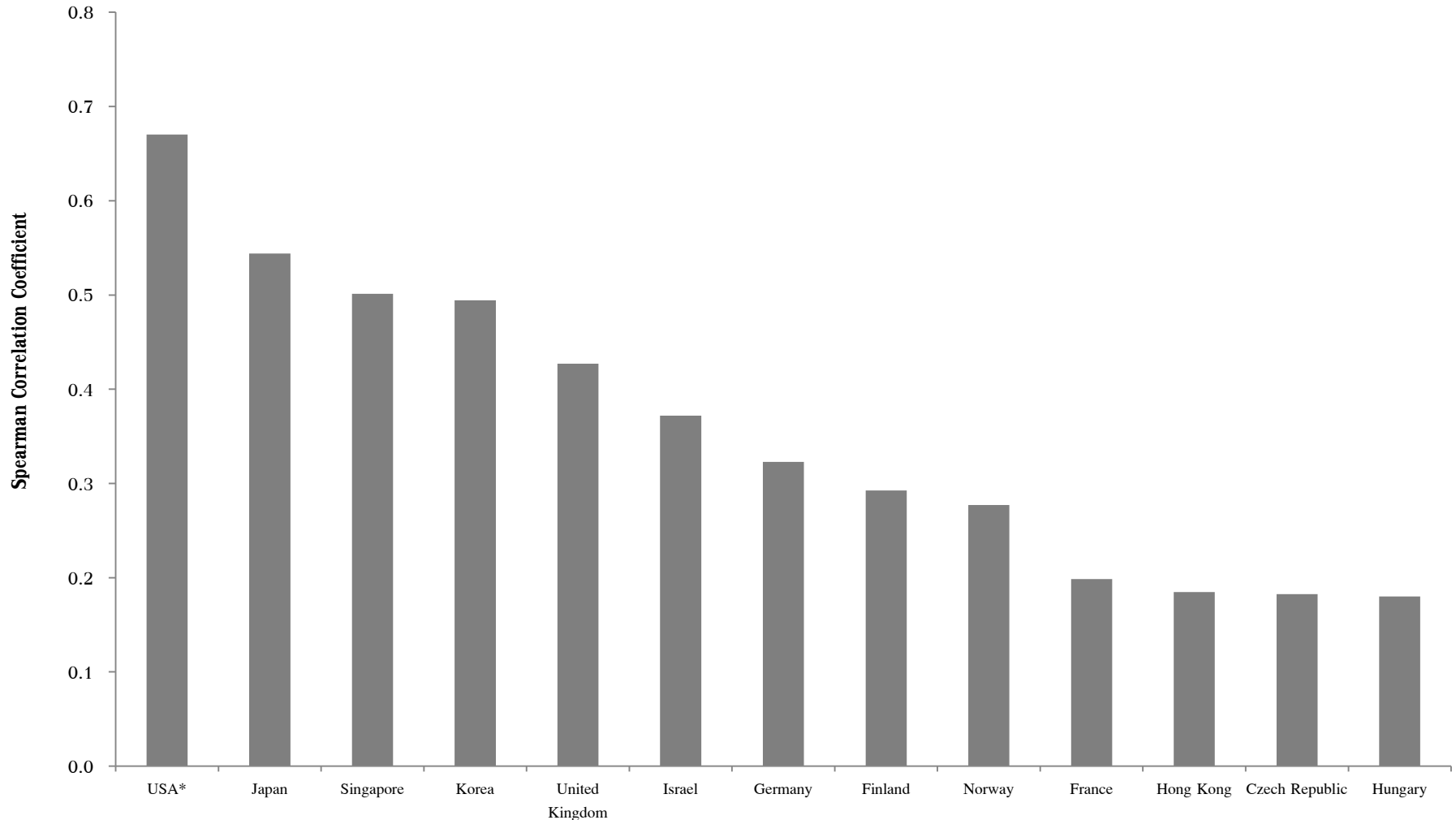
What do we export to the world?

Are we competitive?

NAICS code	NAICS Description	RCA (avg) 2012-2002	Share 2012
3241	Petroleum & Coal Products	2.7	22.7
3251	Basic Chemicals	2.8	10.5
3252	Resin, Syn Rubber, Artf & Syn Fibers/fil	3.0	5.9
3344	Semiconductors & Other Electronic Components	1.6	5.6
3341	Computer Equipment	1.3	5.1
3363	Motor Vehicle Parts	1.4	4.7
3331	Ag & Construction & Machinery	3.6	4.6
3342	Communications Equipment	1.3	3.6
3339	Other General Purpose Machinery	1.0	2.9
3345	Navigational/measuring/medical/control Instrument	1.0	2.6
3361	Motor Vehicles	0.4	2.5
3329	Other Fabricated Metal Products	1.3	2.5
3364	Aerospace Products & Parts	1.0	2.3
3336	Engines, Turbines & Power Transmsn Equip	0.9	2.0
3359	Electrical Equipment & Components, Nesoi	1.3	1.8

Texas main competitors in world markets

(Based on export mix similarity)



*USA without Texas

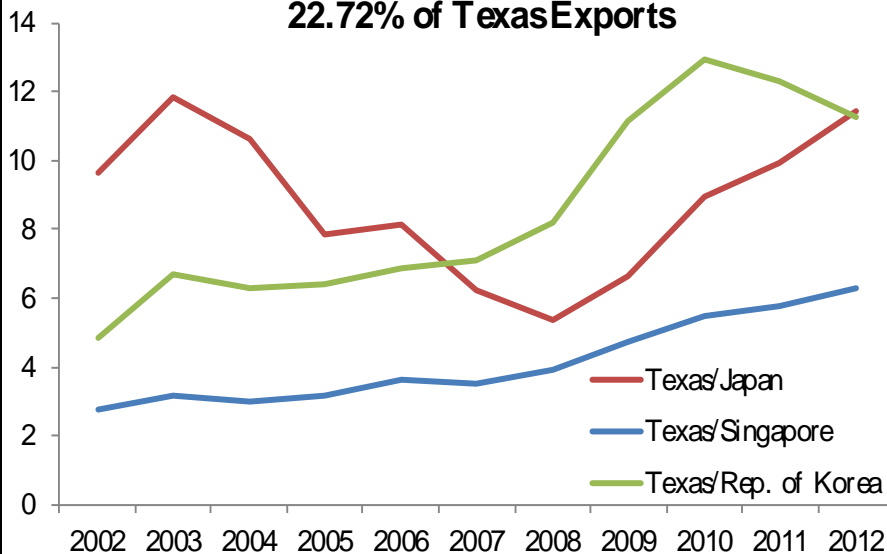
Relative (RCA)

$$\text{Relative RCA} = \left(\frac{RCA_i^{TX}}{RCA_i^{JP,SG,KR}} \right)$$

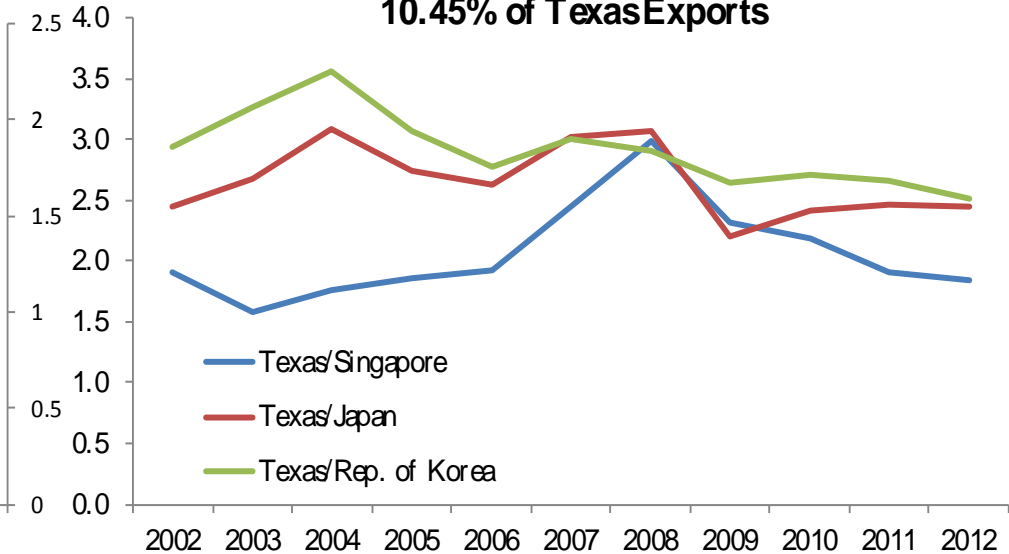
- If the index  => Texas more competitive in global markets than Japan, Singapore or Korea

RCA-Petroleum, Chemical, and Synthetics Manufacturing

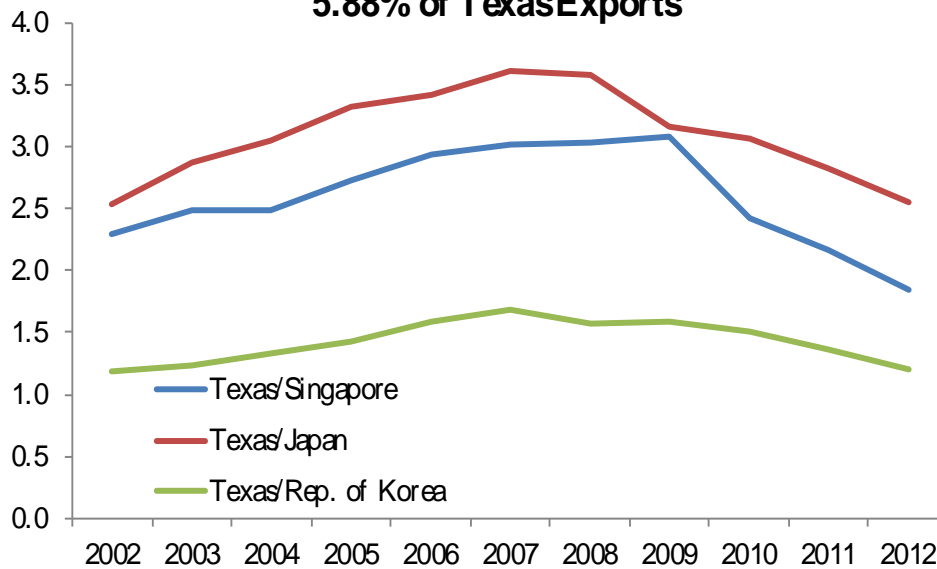
Petroleum & Coal Products 22.72% of Texas Exports



Basic Chemicals 10.45% of Texas Exports

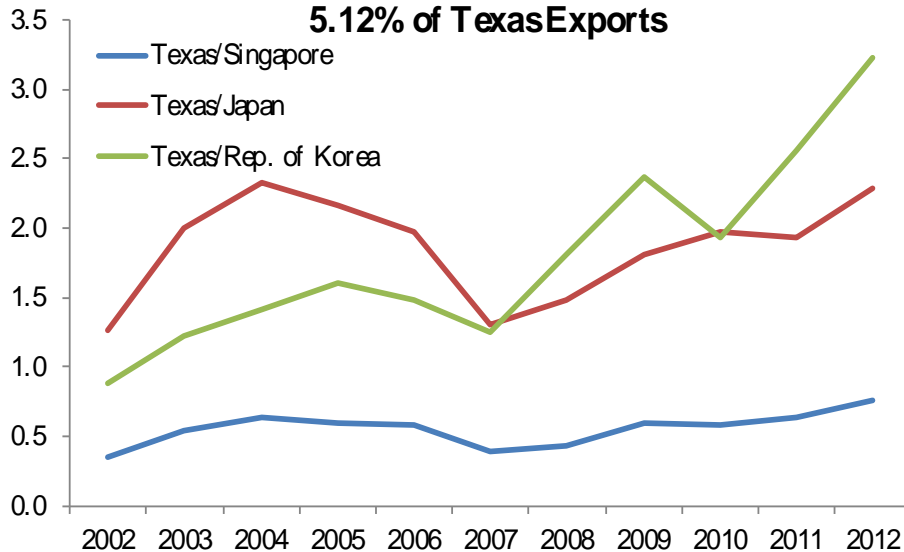


Resin, Synthetic Rubber, Artificial Fibers, etc. 5.88% of Texas Exports

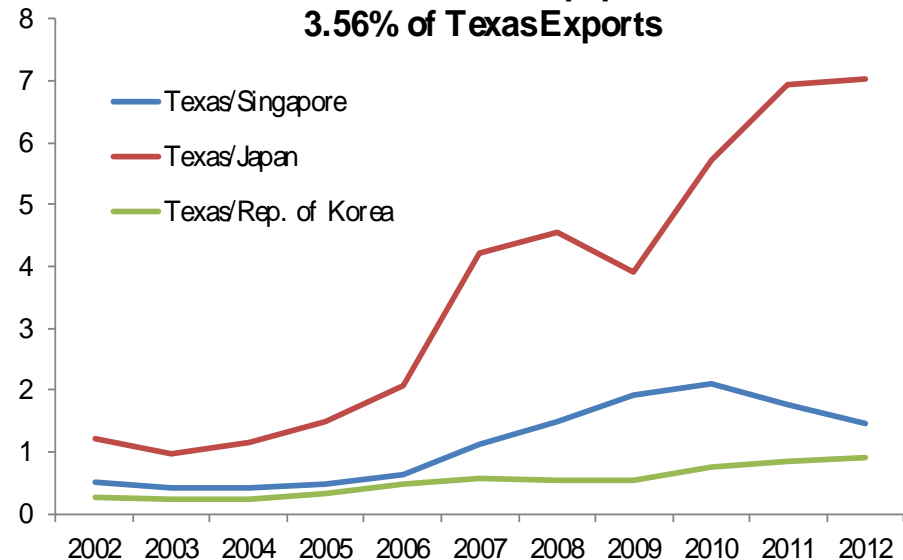


RCA-Computer and Electronic Product Manufacturing

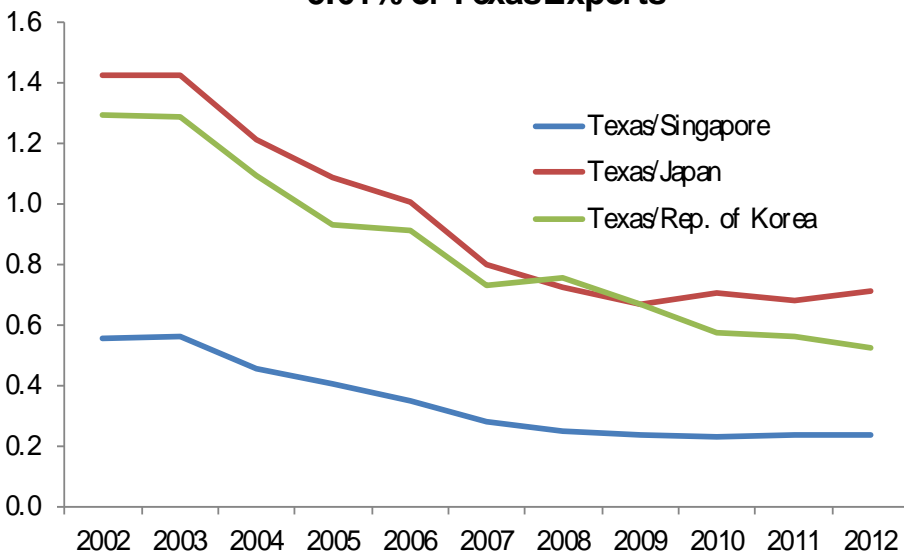
Computer Equipment 5.12% of Texas Exports



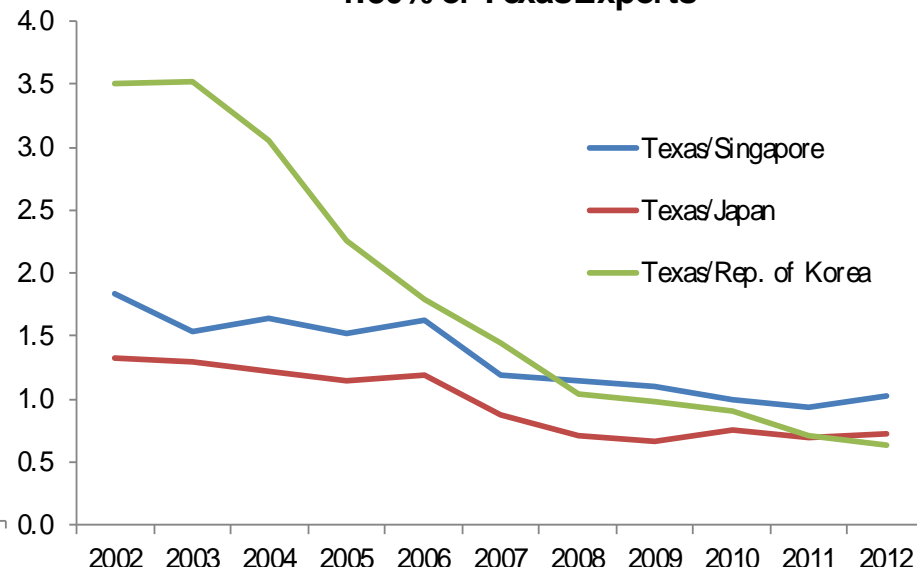
Communications Equipment 3.56% of Texas Exports



Semiconductors & Other Electrical Components 5.61% of Texas Exports

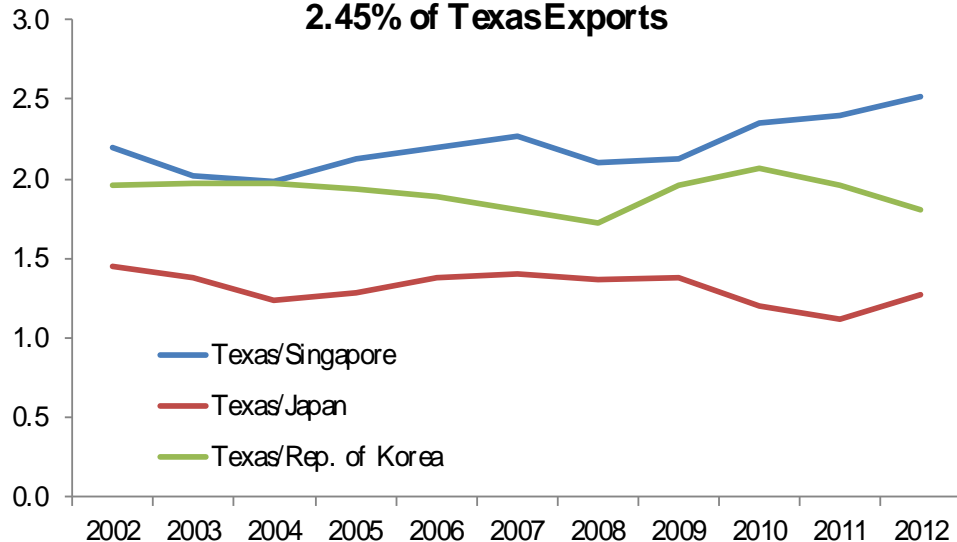


Electrical Equipment & Components 1.80% of Texas Exports

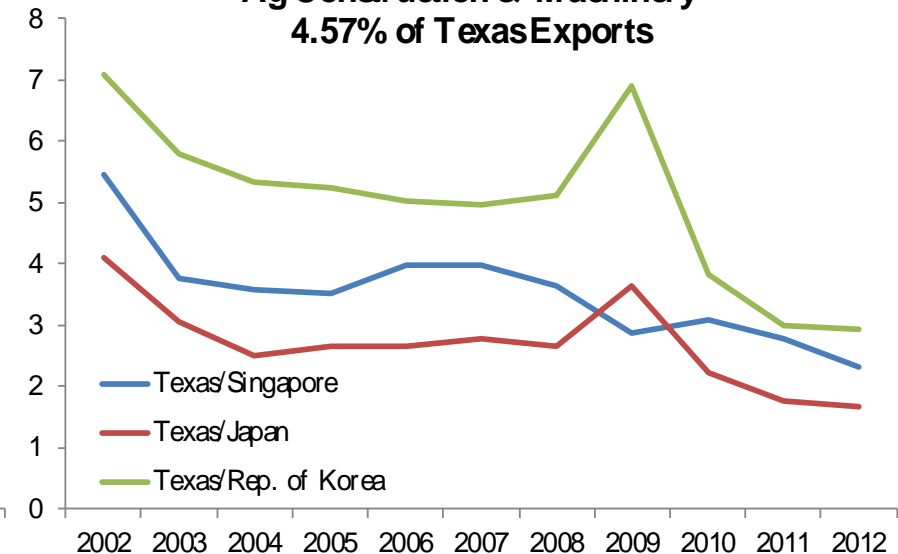


RCA-Machinery and Other Fabricated Metal Manufacturing

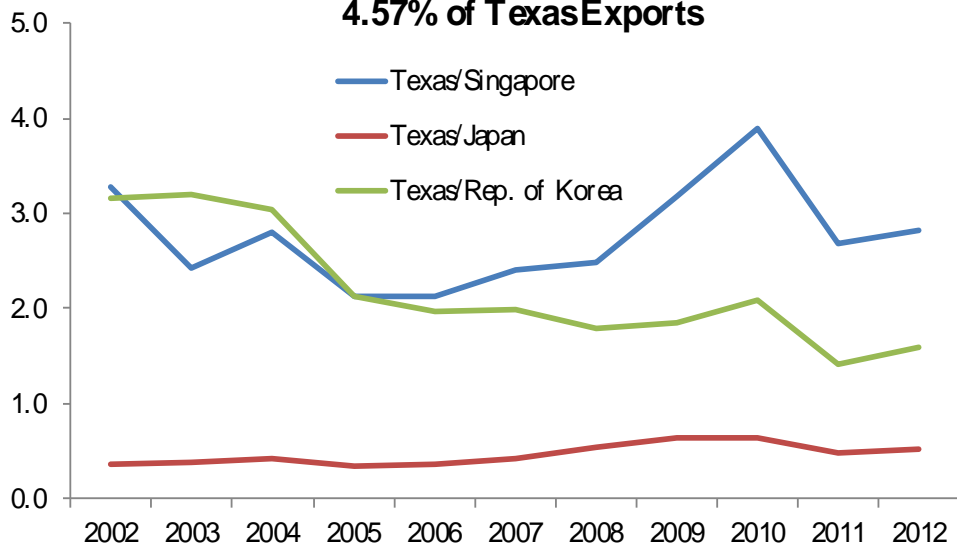
Other Fabricated Metal Products 2.45% of Texas Exports



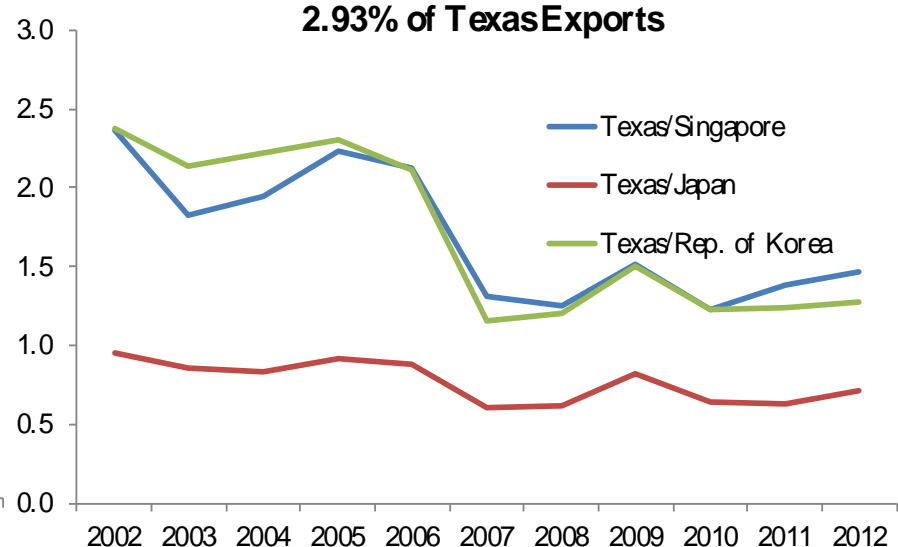
Ag Construction & Machinery 4.57% of Texas Exports



Engines, Turbines & Power Transmission Equipment 4.57% of Texas Exports

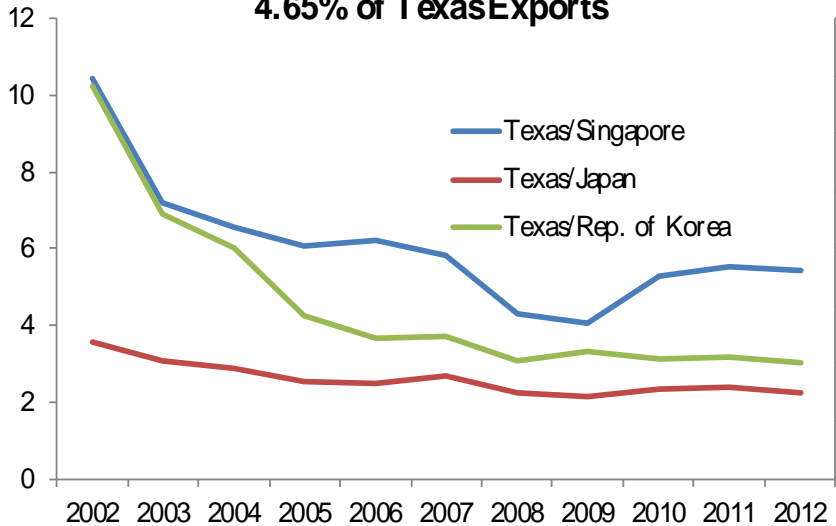


Other General Purpose Machinery 2.93% of Texas Exports

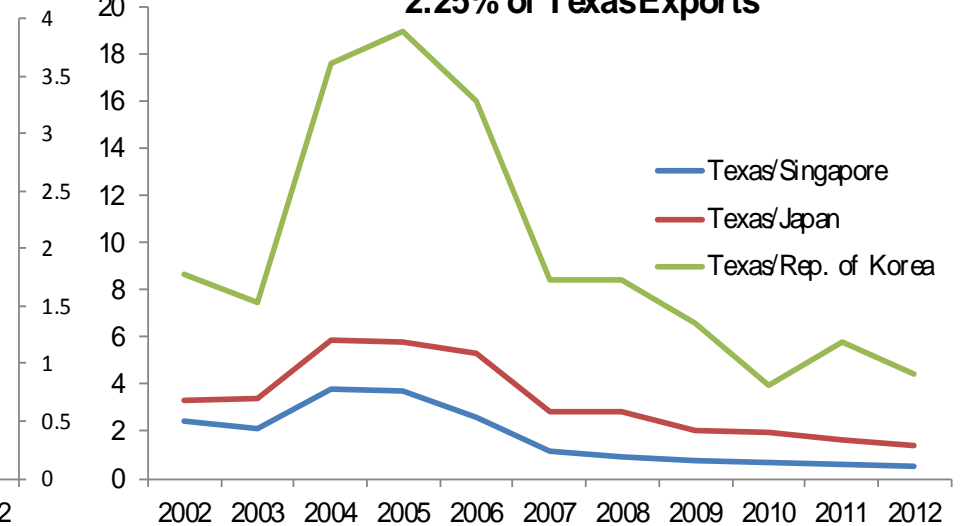


RCA-Transportation Equipment Manufacturing

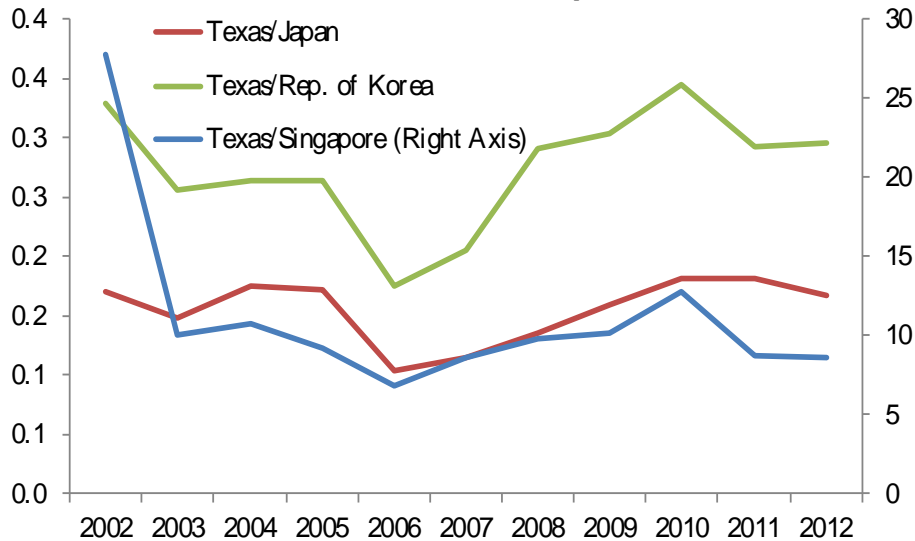
Motor Vehicle Parts 4.65% of Texas Exports



Aerospace Products & Parts 2.25% of Texas Exports

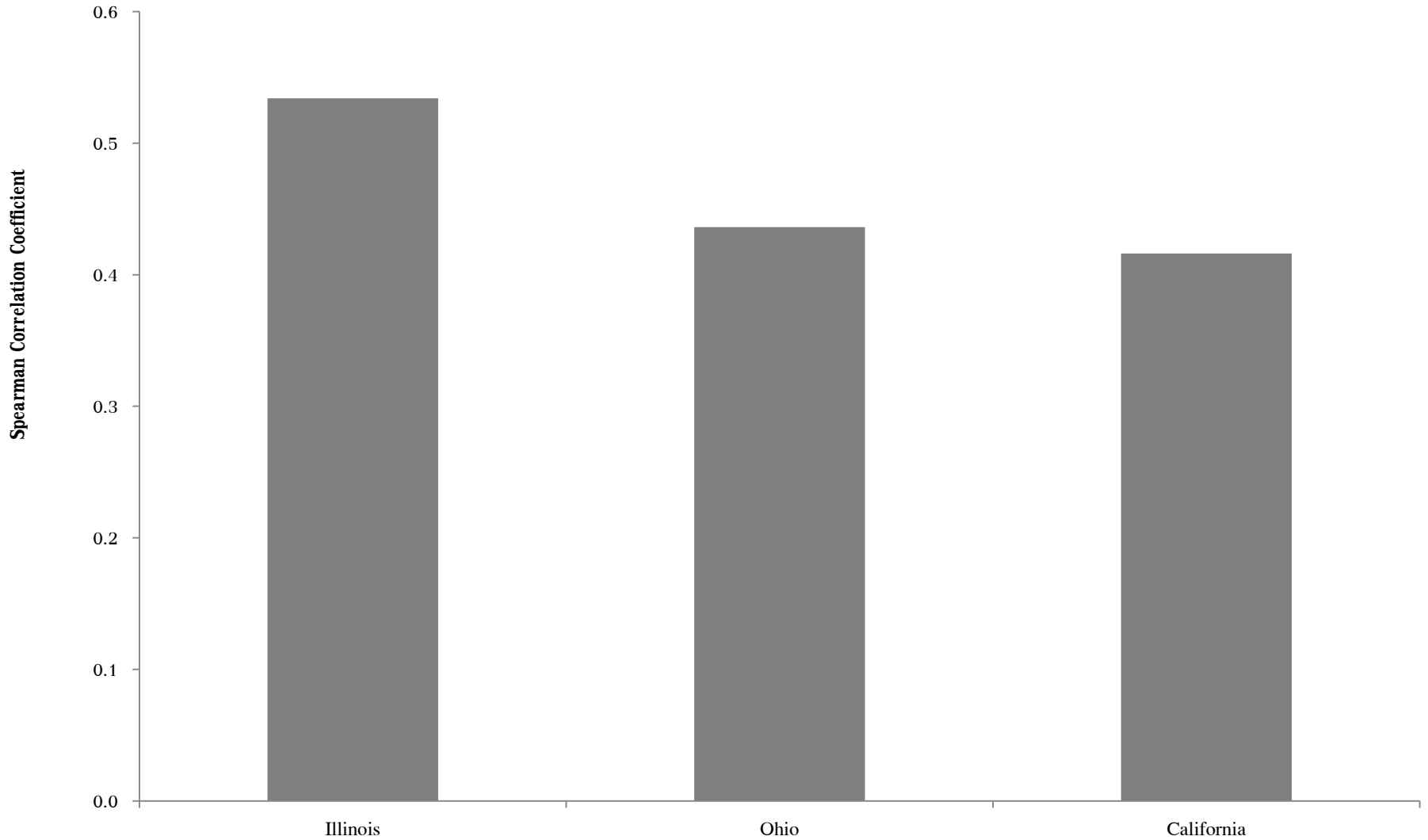


Motor Vehicles 2.53% of Texas Exports



Texas main US competitors in world markets

(Based on export mix similarity)



Relative RCA and relative total factor productivity (TFP)

$$\text{Relative RCA} = \left(\frac{RCA_i^{TX}}{RCA_i^{IL,CA,OH}} \right)$$

Total Factor Productivity (TFP) is determined by how efficiently and in what proportions capital and labor are utilized in production.

$$\text{Relative TFP} = \left(\frac{TFP_i^{TX}}{TFP_i^{IL,CA,OH}} \right)$$

In theory:  TFP =>  RCA =>  market share

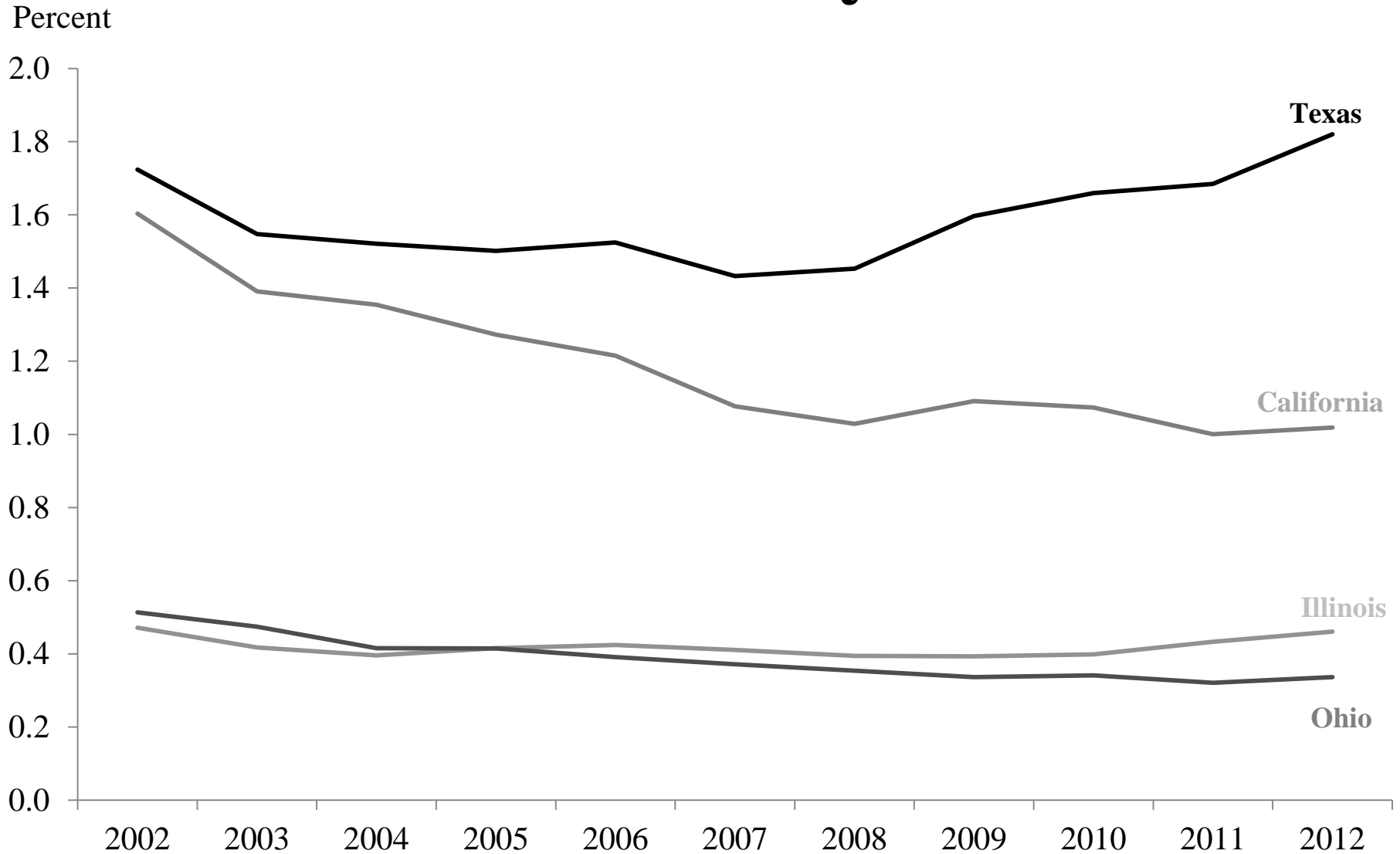
Annual Average Productivity Growth

(2002-2011)

		Texas	California	Illinois	Ohio
3251	Basic Chemicals	21.4	-0.6	4.8	3.6
3364	Aerospace Products & Parts	20.9	8.9	19.6	2.8
3241	Petroleum & Coal Products	20.9	36.9	36.6	24.3
3336	Engines, Turbines & Power Transmsn Equip	18.1	15.6	7.2	16.2
3252	Resin, Syn Rubber, Artf & Syn Fibers/fil	14.1	6.5	22.2	6.4
3359	Electrical Equipment & Components, Nesoi	13.9	13.4	4.4	3.3
3331	Ag & Construction & Machinery	13.7	21.5	16.2	7.0
3339	Other General Purpose Machinery	11.9	5.8	2.1	7.4
3345	Navigational/measuring/medical/control Instrument	11.9	2.1	1.1	1.8
3361	Motor Vehicles*	11.3	9.0	6.5	1.4
3329	Other Fabricated Metal Products	8.2	4.4	3.8	5.5
3363	Motor Vehicle Parts	7.8	7.0	5.5	-0.2
3344	Semiconductors & Other Electronic Components	2.9	7.0	5.9	9.9
3341	Computer Equipment*	-3.2	1.5	1.5	-0.5
3342	Communications Equipment*	-3.2	1.5	1.5	-0.5

*Shows TFP avg. at 3-digit NAICS due to availability

And the state has gained ground in the last 10 years



Texas maintained or improved competitiveness in:

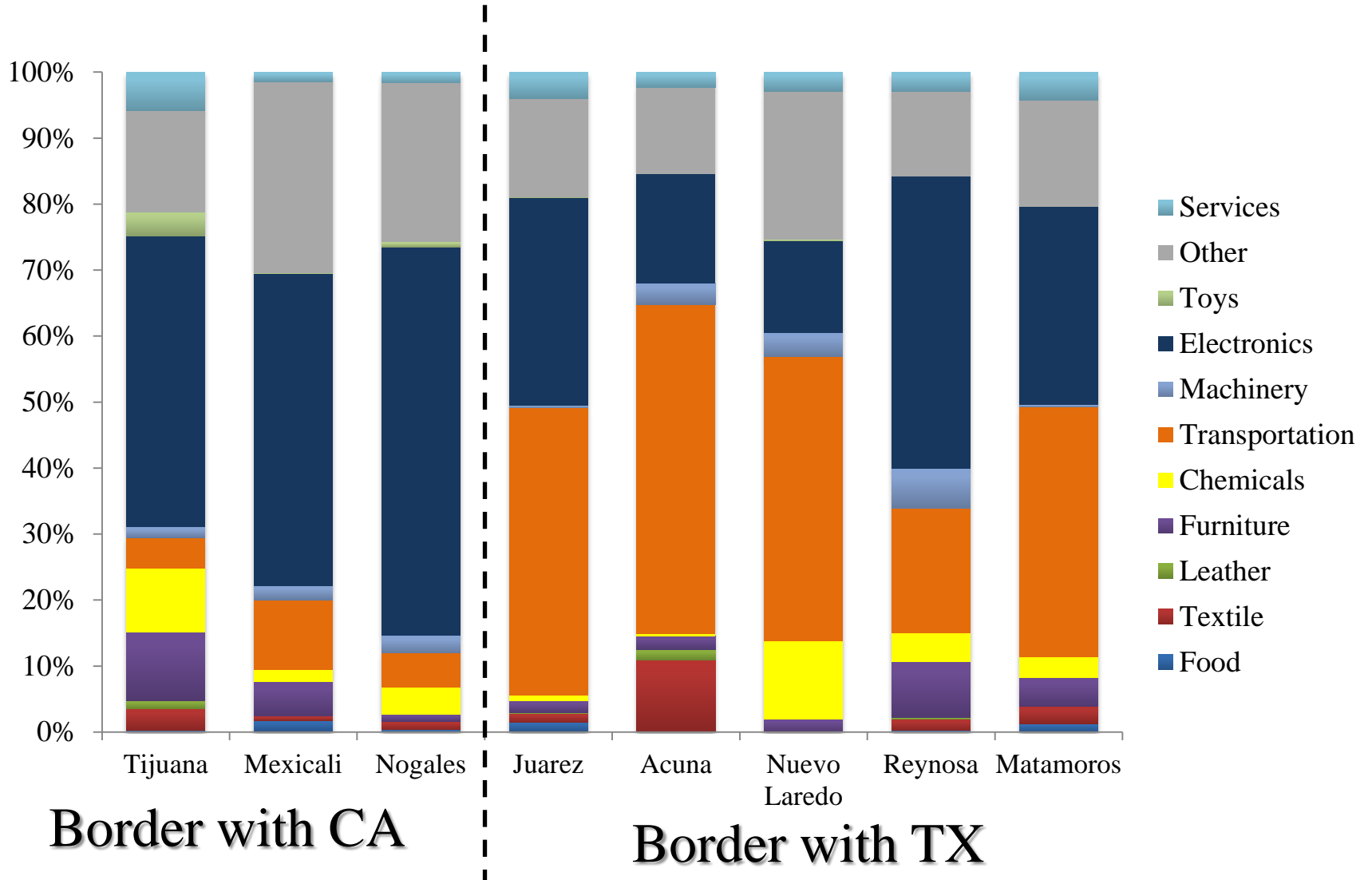
- Petroleum and basic chemicals.
- Heavy machinery
- Transportation equipment

Texas has lost competitiveness in:

- Computer equipment

Maquiladora jobs distribution along the border

Texas: *automotive*



Preliminary results

- Identified Texas' comparative advantages in the manufacturing industry during 2002-2012 (HS to NAICS)
 - Japan, Singapore and Korea
 - California, Illinois and Ohio
- Comparative advantage in energy related industries has improved or held steady
- Gained some ground domestically and kept competitive internationally in heavy machinery

Preliminary results (cont.)

- Gained domestic competitiveness in the automotive industry
- Lost market share in computer and electronics
- Comparative advantage has increased as Texas industries became more productive
- Comparative advantage relative to domestic competitors apparently lay on low-capital intensive goods.

Texas Comparative Advantage and Manufacturing Exports

Ten-Gallon Economy: Sizing Up Texas' Growth

November 7, 2014

Jesus Cañas, Luis Torres and Christina English

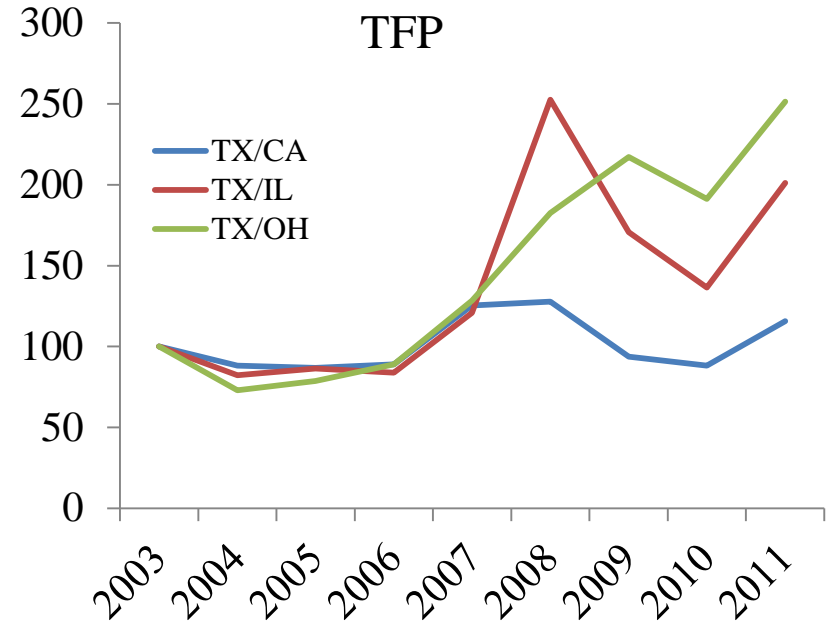
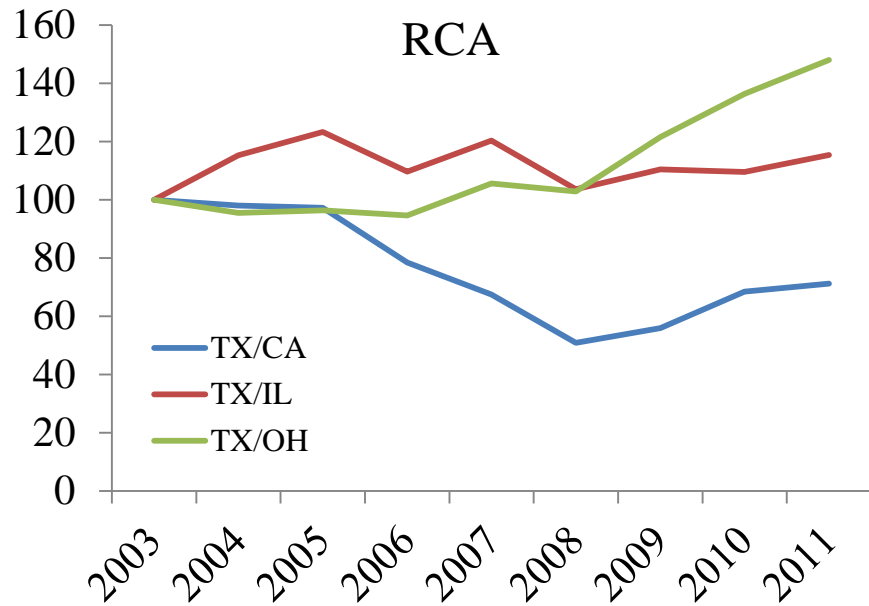
Business Economist

Federal Reserve Bank of Dallas

The views expressed in this presentation are strictly those of the author and do not necessarily reflect the positions of the Federal Reserve Bank of Dallas or of the Federal Reserve System. Any secondary distribution of this material is strictly prohibited. May be quoted with appropriate attribution to the author.

Motor vehicle parts manufacturing

(Index, 2003=100)



Semiconductor and electronic components

(Index, 2003=100)

