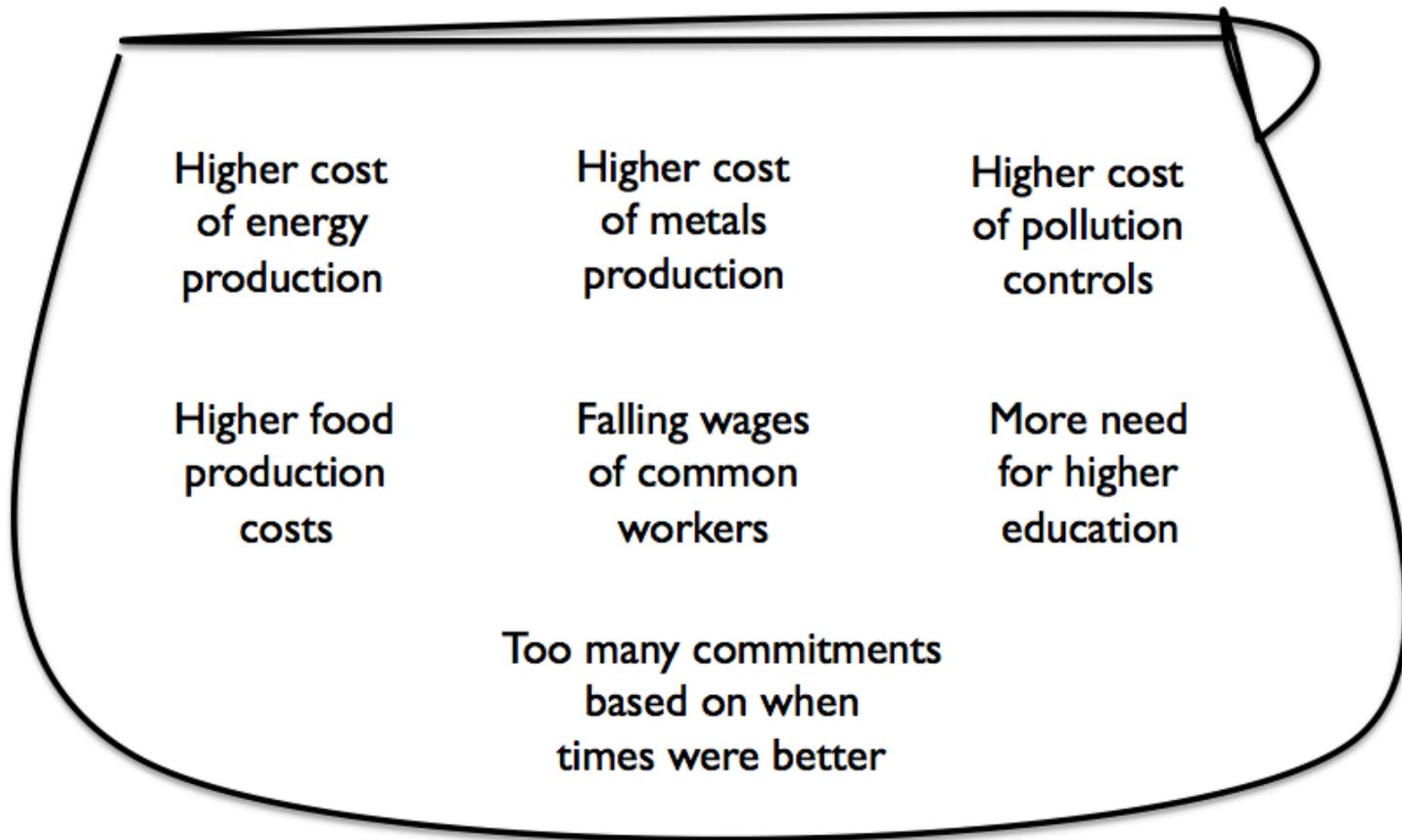


6. Competition, Local Resource Exhaustion, and Other Issues

Gail Tverberg – Energy Economics and Analysis Modeling

We have already identified a number of issues pushing the economy toward collapse

Financial Failure Basket



Gail Tverberg OurFiniteWorld.com

What else is pushing us down?

- ▶ Automation
- ▶ Competition in a Globalized World
 - ▶ High priced energy mix uncompetitive in world market
- ▶ Oil depletion impact on individual countries
 - ▶ Also depletion of other resources—fresh water, coal, metals
- ▶ Effect of low oil prices on oil exporting countries
- ▶ Effect of low oil prices on oil companies
- ▶ Banking problems

Automation

Automation

- ▶ Businesses want to maximize their own profits
 - ▶ Low-cost solution often uses almost no employees
 - ▶ Business ends up with cheap product to sell
 - ▶ But few have jobs to pay for these goods
- ▶ Many unemployed workers in the labor force put downward pressure on wages
 - ▶ Why pay very much in wages, when there are so many looking for jobs?
- ▶ Profits go to management and owners of companies, since there are few workers
- ▶ Not leveraging human labor—setting up system that doesn't use human labor

Competition in a Globalized World

Competition in a Globalized World

- ▶ Constant search for the lowest-cost maker of anything that can be sold internationally
- ▶ Cost of goods sold indirectly reflects many things
 - ▶ Number and wages of workers
 - ▶ Amount spent on pollution control
 - ▶ Amount spent on safe working conditions
 - ▶ Benefits (health insurance, pension insurance) for workers
 - ▶ Amount workers must pay for housing and taxes
 - ▶ Housing costs low if “warm” country—lots of free energy from sun
 - ▶ Taxes low if poor schools, few programs to help the elderly, etc.
 - ▶ If these amounts are low, workers can live on low wages
 - ▶

Globalization (continued)

- ▶ Tendency is to constantly seek the lowest cost
 - ▶ Lowest wages
 - ▶ Least attention to pollution
 - ▶ Least benefits for workers
 - ▶ Lowest cost energy source, no matter how polluting

- ▶ Examples of competitors to China
 - ▶ India
 - ▶ Bangladesh
 - ▶ Philippines
 - ▶ Viet Nam
 - ▶ Some African countries

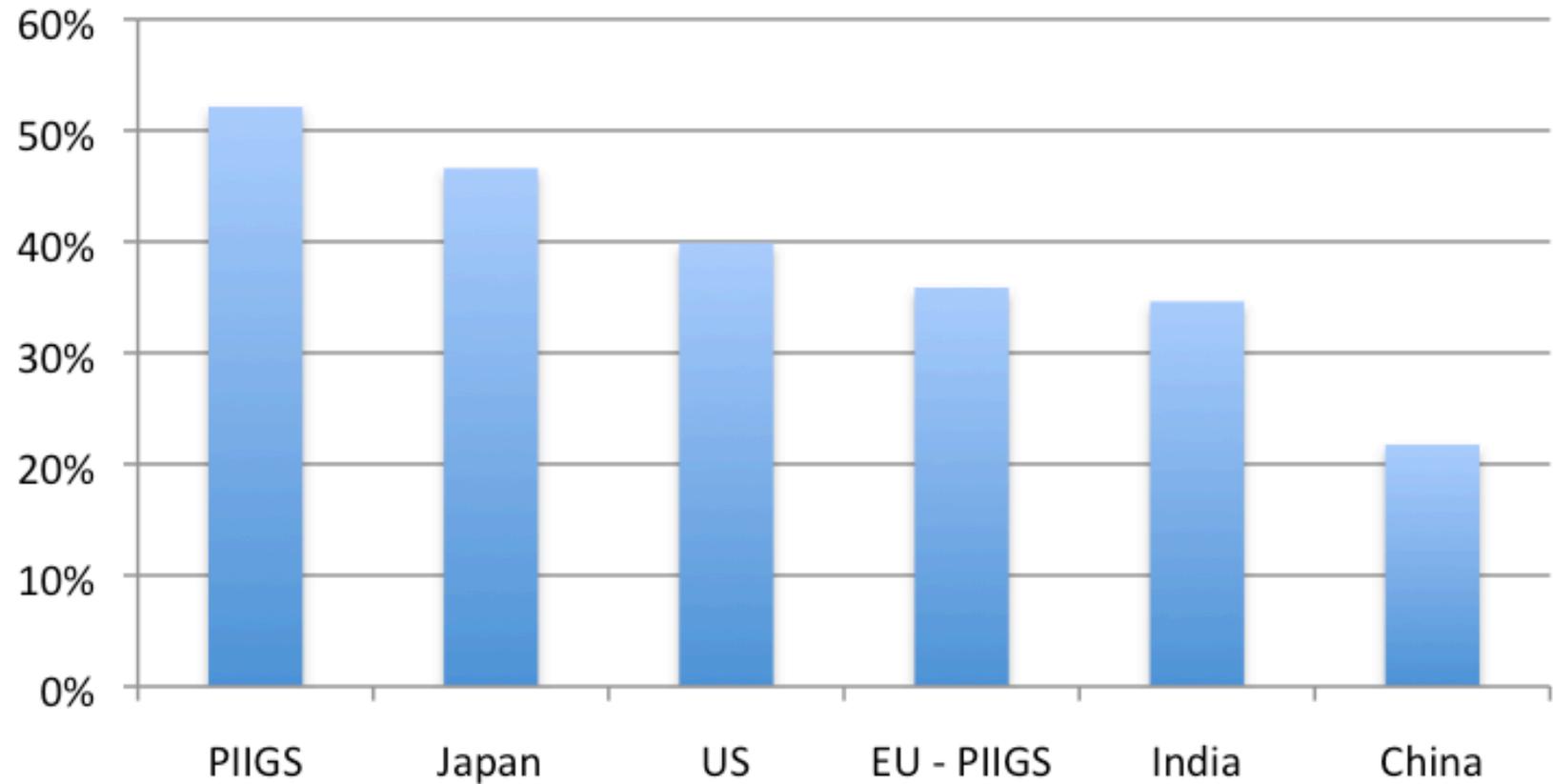
Globalization (continued)

- ▶ Contributes to declining wages of common workers
- ▶ Workers in United States indirectly compete with workers in China, India, and elsewhere
- ▶ If job can be accomplished by lower paid worker elsewhere, job will be moved
 - ▶ Works on service jobs as well as manufacturing
 - ▶ Tends to hold down wages

High priced energy mix is not competitive in a global economy

- ▶ Part of “Globalization” problem
- ▶ If oil prices are high, the countries using very much of oil in their energy mix are the countries that do poorly
 - ▶ Examples
 - ▶ Greece
 - ▶ Also Portugal, Ireland, Italy, Spain, Cyprus
 - ▶ These countries now have high debt levels
 - ▶ Government spending to try to fix problem, lack of revenue

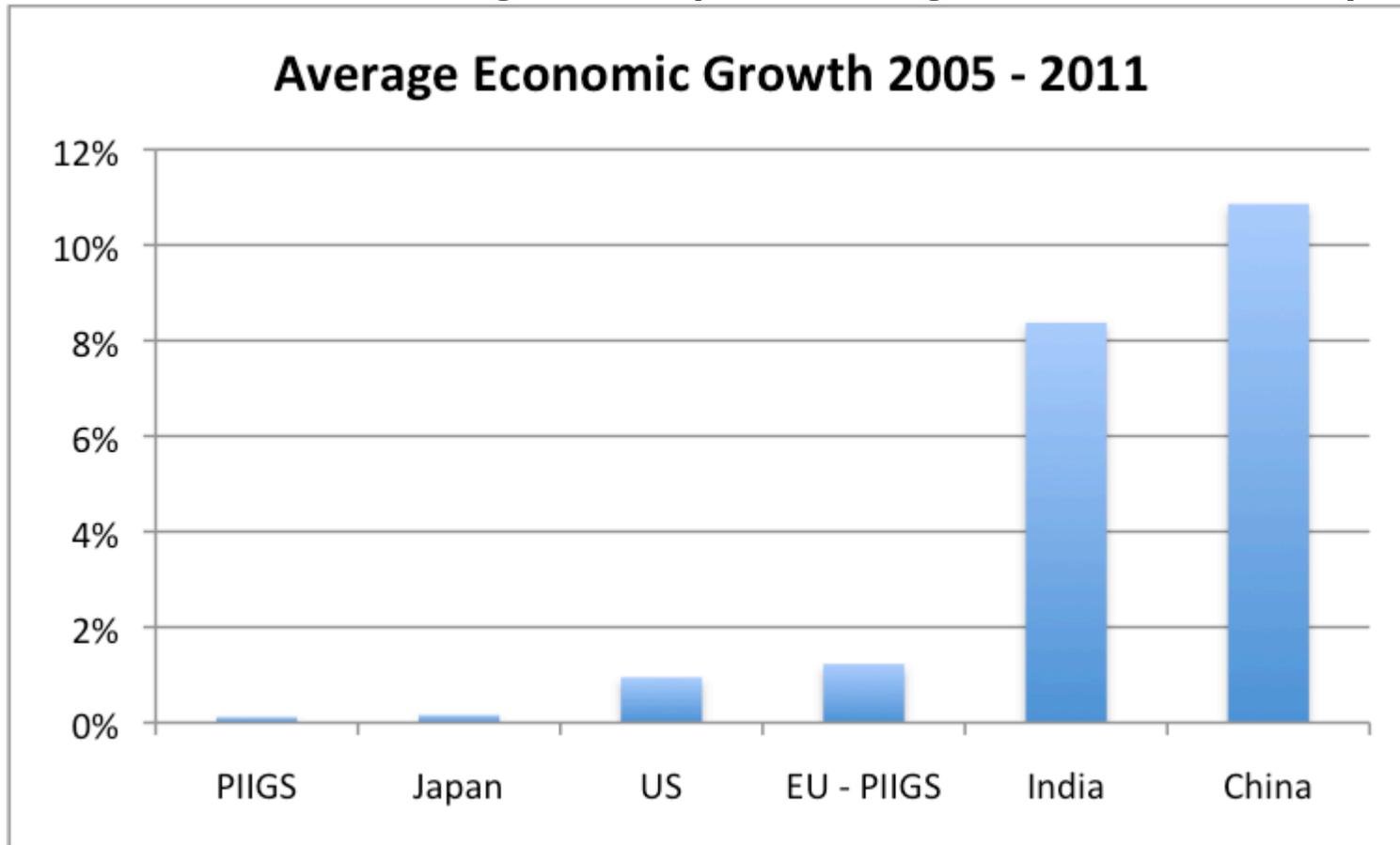
Percent Energy Consumption from Oil - 2004



Based on BP Statistical Review of World Energy data

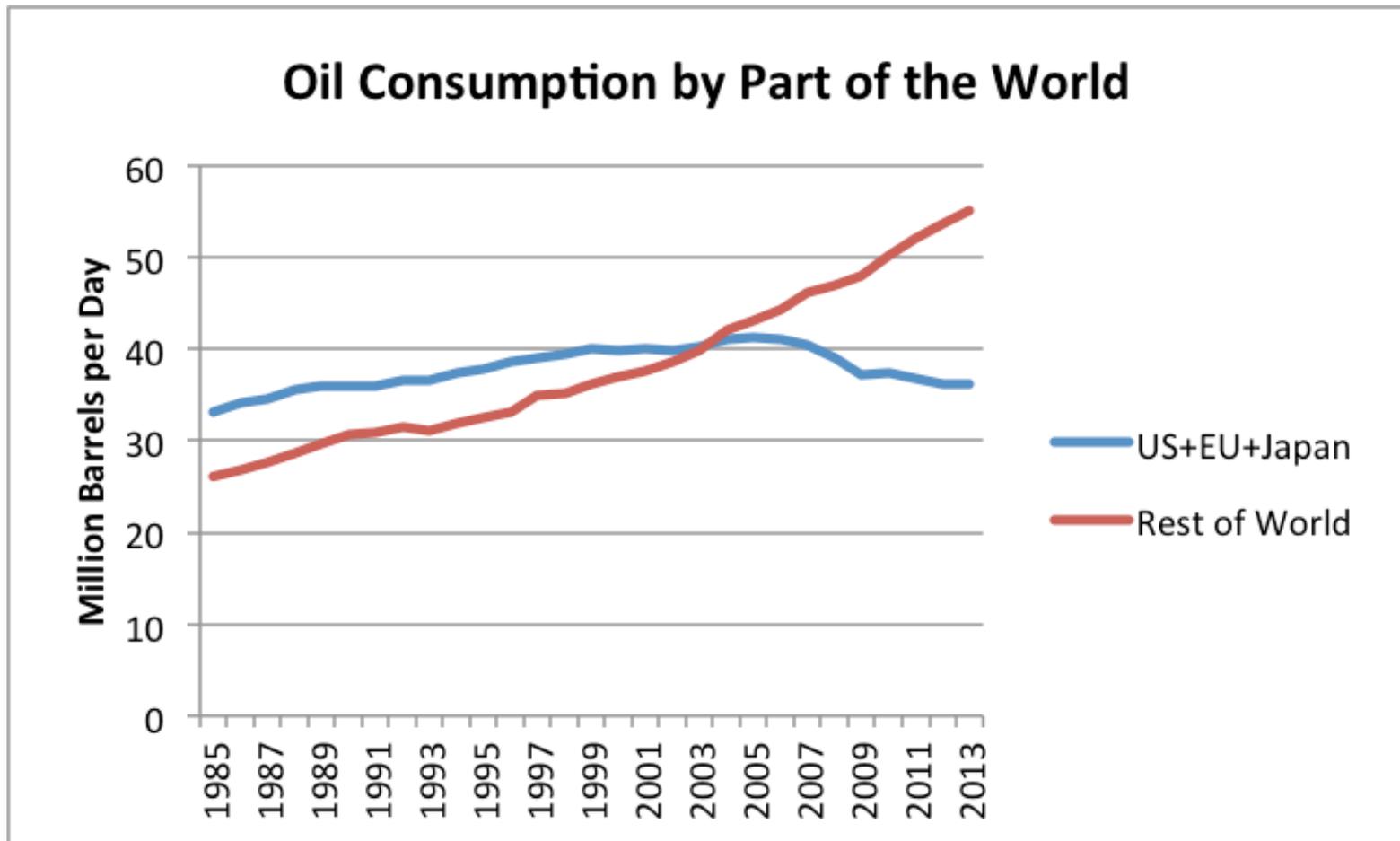
Growth percentages follow same order as oil usage percentages

- ▶ China, India have high coal percentage—coal is cheap



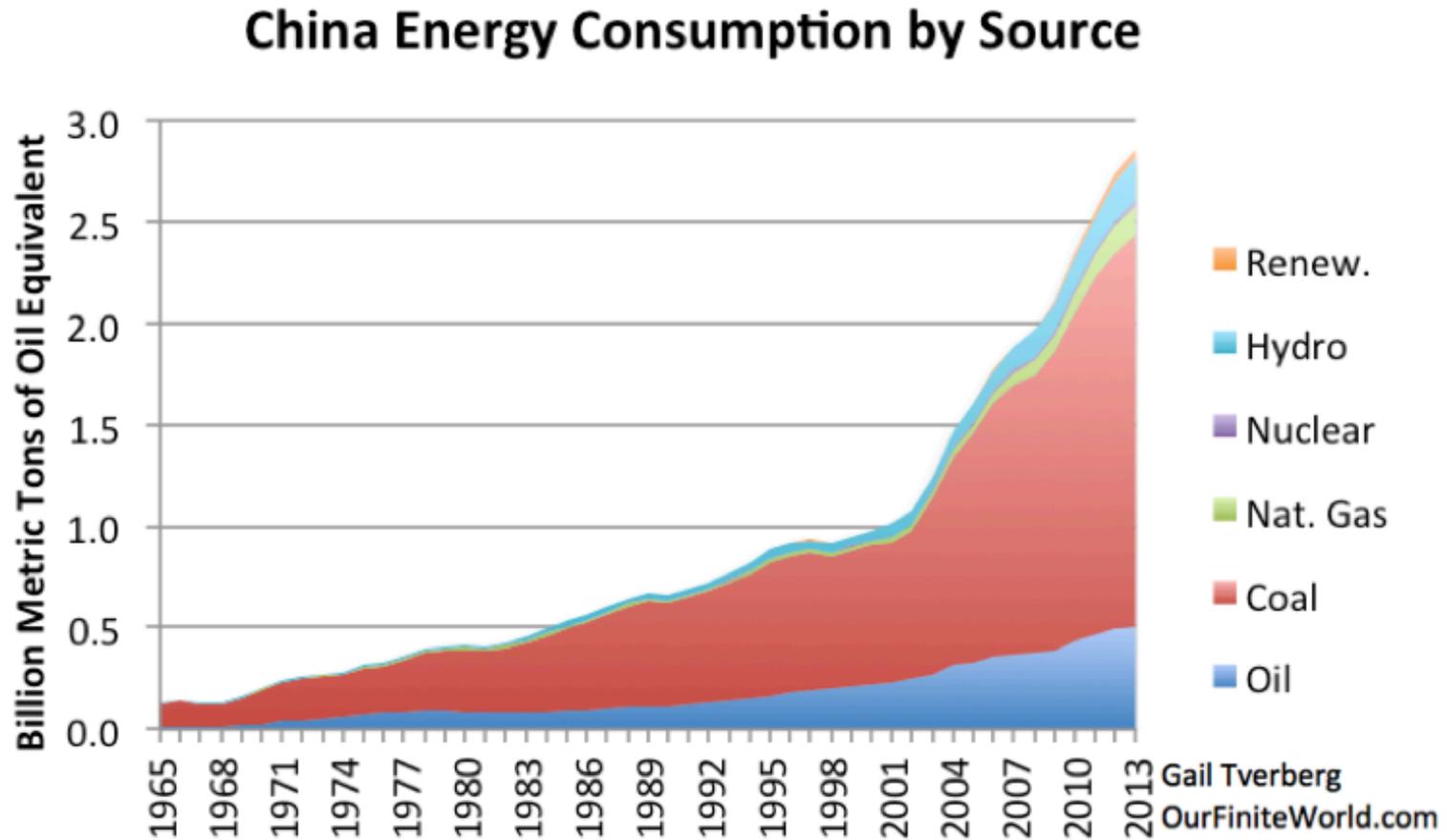
Based on USDA Economic Data Service real GDP data.

Previously industrialized countries (all of which are big oil users) have lowered oil use



Based on data from BP Statistical Review of World Energy 2014.

China's coal consumption has grown as its oil consumption has grown



Based on data from BP Statistical Review of World Energy, 2014

High priced energy mix not competitive in a global economy

- ▶ Adding any type of high-priced energy to a country's energy mix will make that country less competitive
 - ▶ Doesn't matter whether it is "renewable"
 - ▶ Even adding a carbon tax makes a country less competitive
 - ▶ Possible exception—if low cost competitors are also adding carbon tax
- ▶ Indirect impacts of higher energy prices
 - ▶ Fewer jobs
 - ▶ Lower wages
 - ▶ Lowers world energy demand, because of the lower affordability within the country with the high-priced energy
 - ▶ Country with high-priced energy tends to collapse more quickly

World economy doesn't move toward higher cost fuels

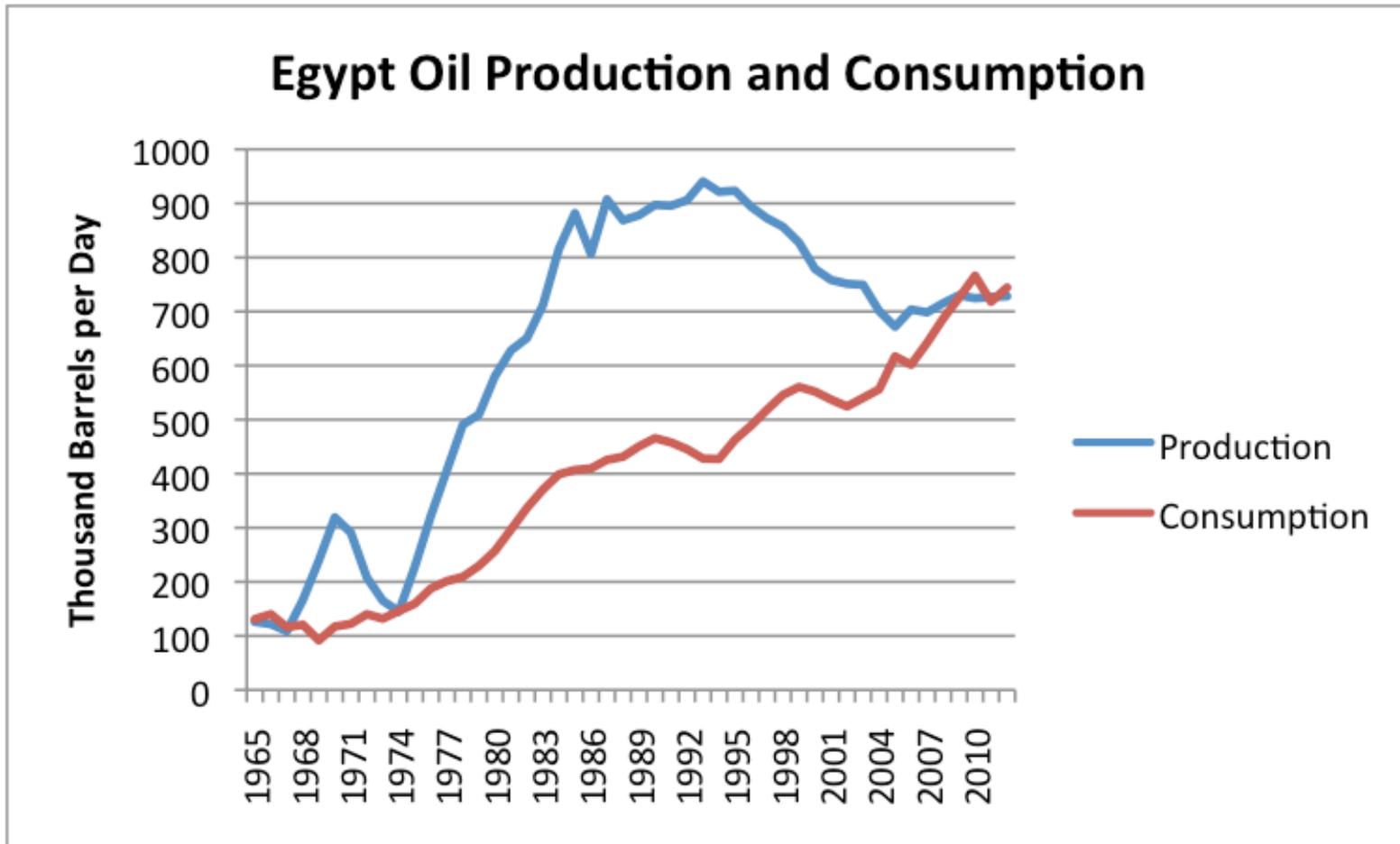
- ▶ It moves toward countries that have the cheapest overall cost of production
 - ▶ World moved away from oil, as its cost rose
 - ▶ Jobs were lost in countries that used much oil
- ▶ Economy needs rapidly rising amounts of energy that match the built infrastructure
 - ▶ Diminishing returns hits oil plus many other goods/services
 - ▶ Examples: Growing government services, depleted ores for extraction, need for desalination to obtain enough fresh water extraction
 - ▶ Impossible to obtain rapidly rising quantity of energy with low EROEI energy products
 - ▶ Cost would be very, very high
 - ▶ Strongly suggests idea that that world can shift toward lower EROEI energy products in incorrect

Impact of Oil Depletion on Individual Countries

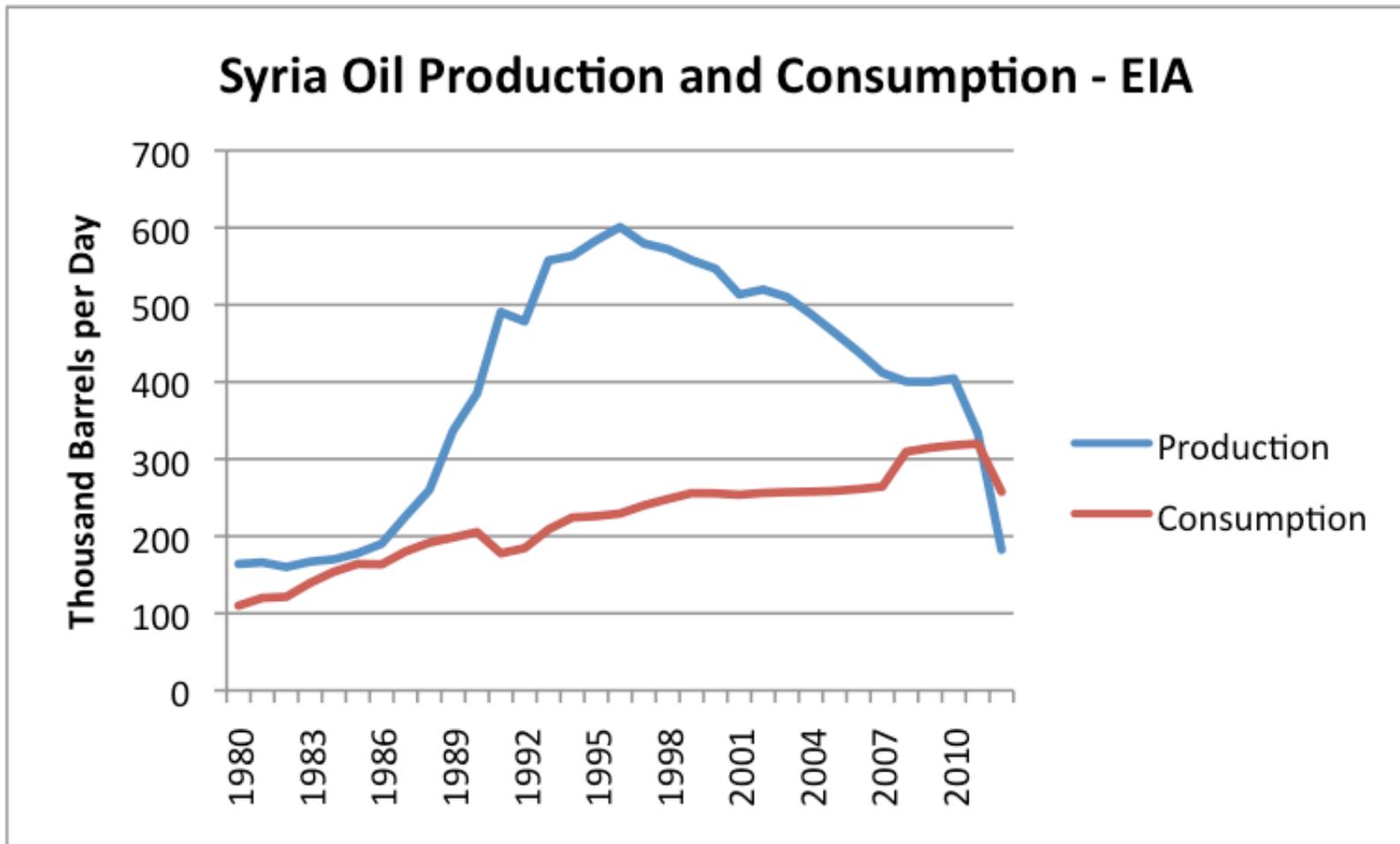
Oil depletion impact on individual countries

- ▶ Even if world oil extraction does not decline, oil extraction in some countries does decline
- ▶ Countries with exports falling to zero often do very badly
 - ▶ Financial problems
 - ▶ Civil wars
- ▶ Examples
 - ▶ Egypt
 - ▶ Syria
 - ▶ Yemen

Egypt's problems since 2010 are oil-related

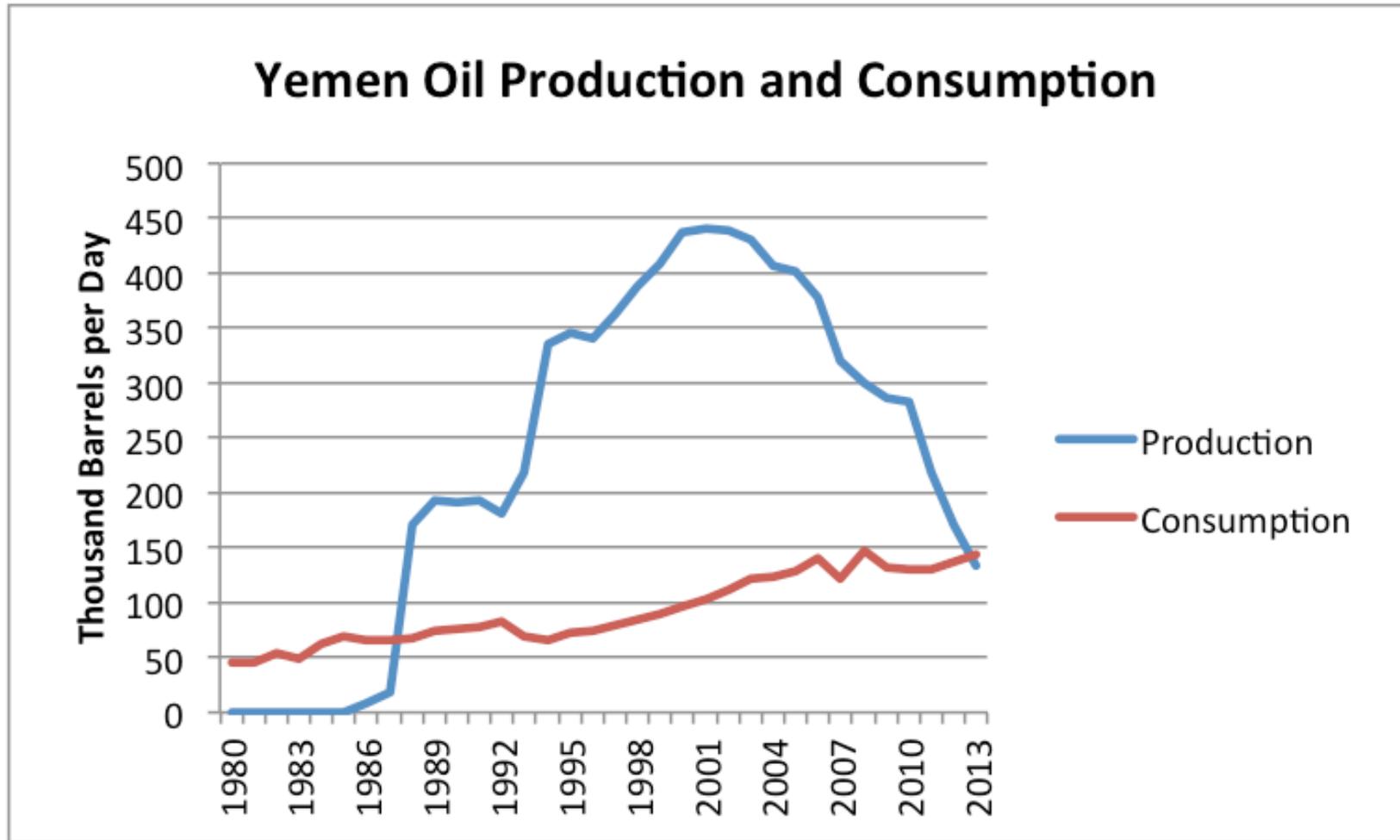


Syria's problems have an oil component as well



Based on data of US Energy Information Administration.

Yemen no longer has oil export revenue to maintain its economy



Based on US Energy Information Administration data.

Problem is that country “can’t go backward”

- ▶ When energy supplies were high
 - ▶ Population rose – now need jobs, food, and water for these people
 - ▶ Started programs people expect – such as subsidized food prices, subsidized oil price, schools, pensions
- ▶ Now the countries no longer have oil to export
 - ▶ Countries can no longer afford the services provided in the past
 - ▶ Governments can’t tax the population enough to provide these services
- ▶ Result
 - ▶ Civil war, collapsing government, debt that cannot be paid

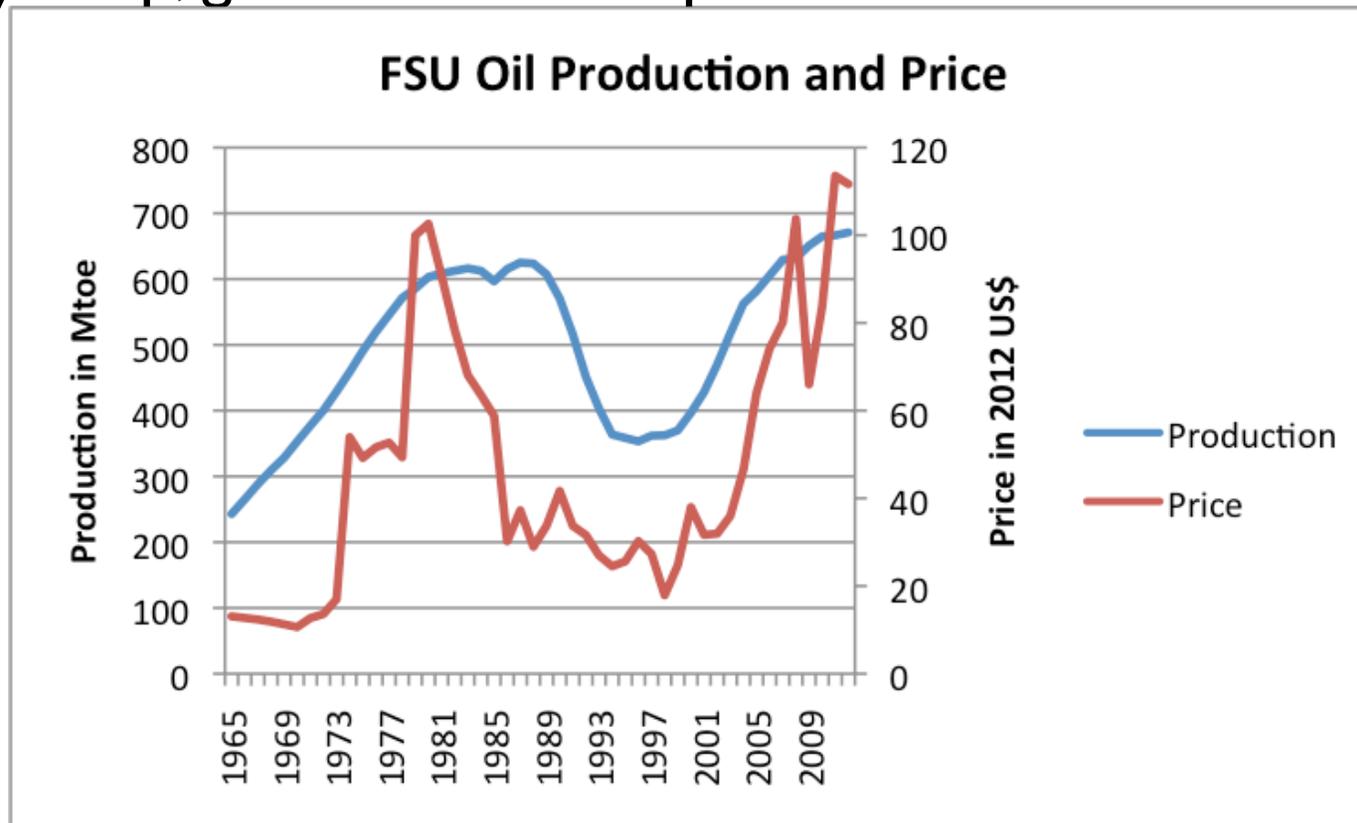
Problems of countries with collapsing oil exports may be “exported” to neighbors

- ▶ Example: ISIS – In Iraq, besides Syria
- ▶ Also refugees moving into other countries
- ▶ With finite energy supplies, this pattern happens many times

Impact of Low Oil Prices on Oil Exporters

Effect of low oil prices on exporting countries

- ▶ If price stays low for an extended period, oil production may drop; government collapse



Based on data of BP Statistical Review of World Energy 2013

Collapse of Former Soviet Union in 1991 seems to be related to low oil price

- ▶ Collapse was government collapse
 - ▶ This is type of collapse that could be expected based on Turchin's analysis
- ▶ Production of Russia rose again later, also other FSU countries
- ▶ Big drop-off in FSU production “saved oil for later”
 - ▶ This is part of the reason we have been able to continue for so long without huge problem with world oil supply/ demand
- ▶ Venezuela has financial difficulties now
 - ▶ It may collapse in the future
- ▶ If the government of an oil exporting country collapses, its oil exports may drop rapidly
 - ▶ Could happen with many of today's exporting countries

Even if government doesn't collapse, low oil price creates huge problems for oil exporters

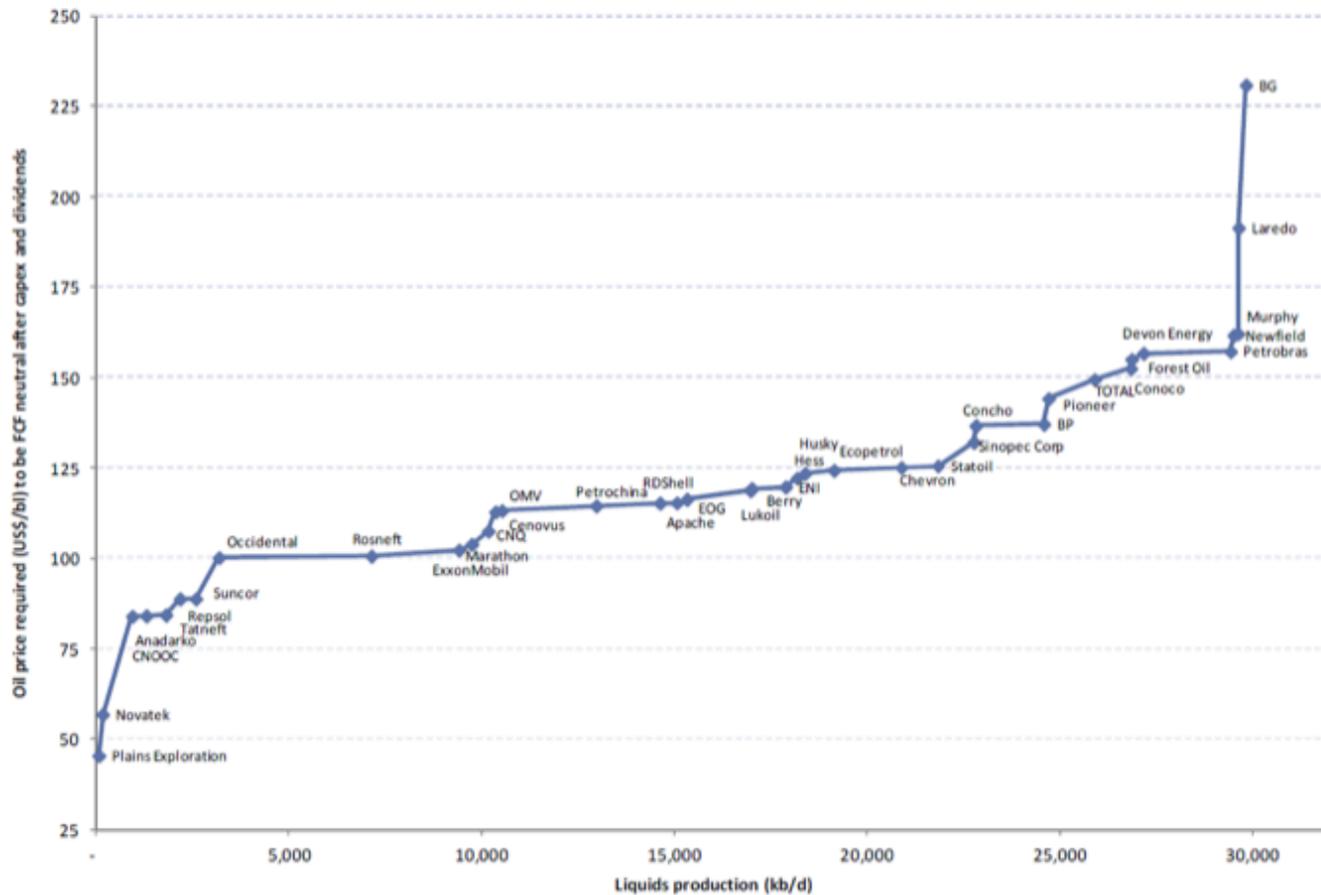
- ▶ **Governments cannot afford many planned programs**
 - ▶ Desalination of water and irrigation programs
 - ▶ Job programs
 - ▶ Food subsidies
 - ▶ Schools, roads, health care programs
 - ▶ Leads to unemployment, unrest within country
- ▶ **Laid off workers are likely to have loans**
 - ▶ Will default on those loans
- ▶ **Banks offering loans will have financial problems**

Impact of Low Oil Prices on Oil Companies

Oil companies do not want anyone to know how badly low oil prices affect them

- ▶ Want to give the impression that everything is OK
 - ▶ Want investors to believe they should purchase the stock
- ▶ There are many different cost levels that oil companies can discuss
- ▶ Highest cost level: Price required to cover all costs, including exploration for new oil, cost of dividends, and payments needed for interest on debt
 - ▶ Will allow “cash flow” to be neutral or positive
 - ▶ Cost on cash flow basis for many US companies in 2014 was \$125 - \$175 per barrel
 - ▶ This is really the cost level of importance
 - ▶ Other levels give misleadingly optimistic view of the future

Most US shale companies need oil prices of \$125 to \$175 to be cash flow neutral.
 TOTAL (French oil company) is \$150; BP is \$137; Chevron is \$125



Oil Price Required by Oil Companies to be Free Cash Flow Neutral After Capex and Dividends

Source: Goldman Sachs

Exhibit (2014) by Steve Kopits in <http://energypolicy.columbia.edu/sites/default/files/energy/Kopits%20-%20Oil%20and%20Economic%20Growth%20%28SIPA%2C%202014%29%20-%20Presentation%20Version%5B1%5D.pdf>

Oil companies can provide other cost levels

- ▶ Another estimate: Cost of continuing production on wells already drilled
 - ▶ Very low
 - ▶ Especially if overhead costs excluded
- ▶ A third estimate: Cost of oil production, assuming wells will produce oil for 40 years, declining slowly during this period, and prices will remain high
 - ▶ Don't really know that wells will produce for more than a few years
 - ▶ Allows company to say that wells will eventually be profitable
 - ▶ Many financial statements prepared on this basis

Oil companies are heavily dependent on adding more debt

- ▶ Need for debt occurs because oil prices are too low
 - ▶ Can't pay all of the company's needed costs
 - ▶ Oil companies were adding debt at \$100 barrel
 - ▶ This price was already too low for many companies!
 - ▶ Companies were already cutting back on new exploration
- ▶ *Need for debt increases as oil prices decrease*
- ▶ *Willingness of banks to lend decreases as oil price decreases*
 - ▶ Banks determine amount they will lend based on (a = Quantity of oil that can be profitably extracted) x (b = Oil price)
 - ▶ If oil price drops, both (a) and (b) decrease
 - ▶ Result: Lending cut back over a period of months with low prices

Shale companies likely to have financial difficulties in 2015

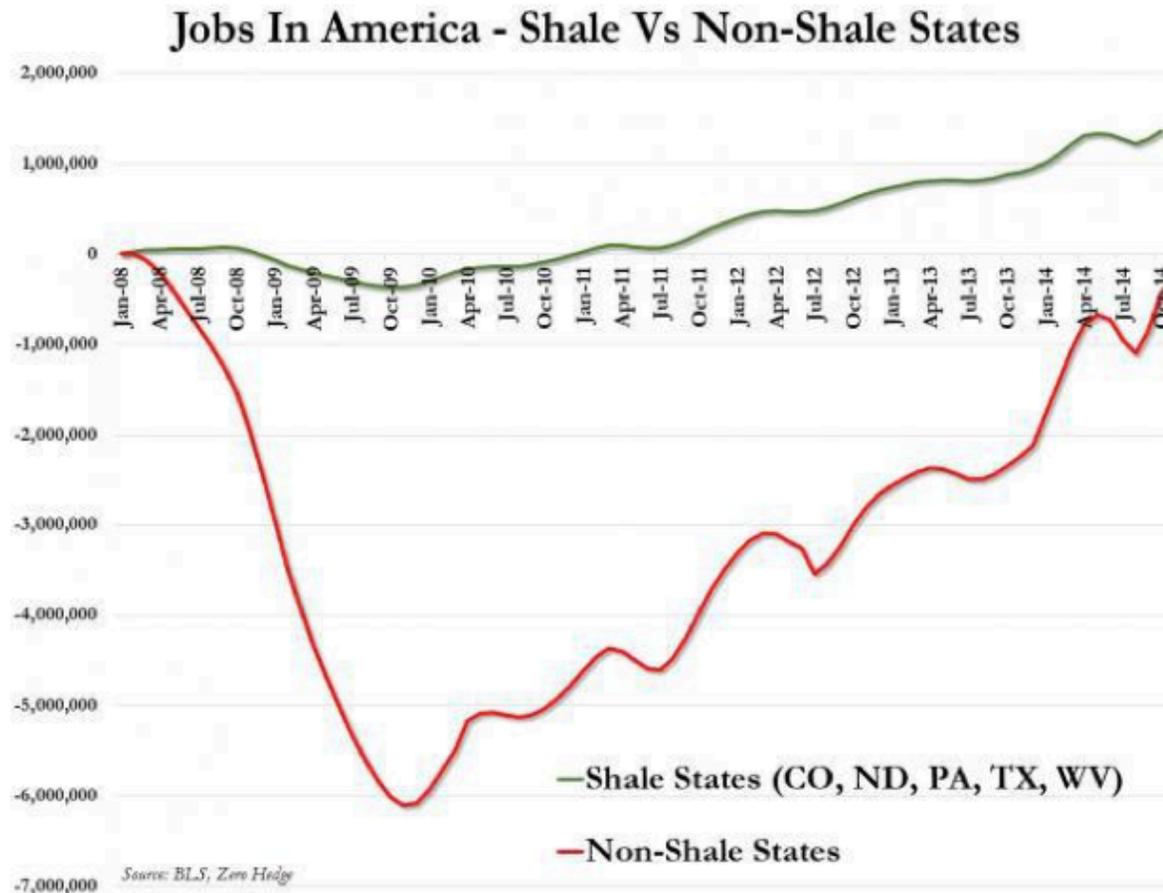
- ▶ Lenders gradually reflect lower oil price in calculation
 - ▶ Typically last 12 month average oil price, or something similar
- ▶ Small companies already filing for bankruptcy
- ▶ Expect more companies to file for bankruptcy after March 31, 2015 financial results; more yet after June 30, 2015 results
 - ▶ Assets may be auctioned off
 - ▶ Question: What companies will be willing to buy these assets? For how much?
- ▶ Little chance that oil production from shale can rise again
 - ▶ Too much debt needed
 - ▶ Banks not willing to lend, once it is clear that oil prices can drop low
 - ▶ Even if new company buys assets, debt needs will remain high
- ▶ Even if oil prices eventually rise, unlikely shale can be restarted

Many indirect impacts of failure of shale oil companies

- ▶ Employees will lose jobs
 - ▶ Many will not be able to sell their homes
 - ▶ New homes have been built for workers; don't need them now
- ▶ Banks holding mortgages loans will encounter difficulty
 - ▶ Who will bail these banks out?
- ▶ Other businesses that have been added for new population of workers will no longer be needed
 - ▶ Fewer grocery stores
 - ▶ Fewer schools
- ▶ Governments may be left with indirect problems
 - ▶ Payments to unemployed workers
 - ▶ Pay for schools that are no longer needed

Growth in jobs in shale states accounted for most US jobs added since 2008

- ▶ These jobs are now being lost



<http://www.zerohedge.com/news/2014-12-03/jobs-shale-states-vs-non-shale-states>

Banking Problems

We noted banking problems earlier

- ▶ One problem: Taking out loan when economy was growing
 - ▶ Having to pay back loan when laid off from job
 - ▶ Or when company was producing less
- ▶ Another problem: Using debt to finance investment in stocks
 - ▶ If stock market goes down, this is a problem
 - ▶ Especially likely US government decides to raise interest rates
- ▶ “Derivatives” present an additional problem for banks
 - ▶ “Derivatives” allow businesses to “hedge” low oil prices
 - ▶ Allow oil companies to “lock in” certain price range on oil
 - ▶ Or other businesses to “lock in” interest rates
 - ▶ But also allow anyone to gamble on outcomes
 - ▶ Used in creating ETFs – to “follow” price of oil
 - ▶ Several large banks involved in this business

Derivatives have potential to become oversize banking problem

- ▶ Amount of derivatives is extremely large
 - ▶ Many times the amount of goods and services produced worldwide, each year
- ▶ Derivatives have the potential of producing very large losses
 - ▶ Especially if rapid shift in currency relativities; interest rates
 - ▶ Or many bankruptcies
- ▶ Governments have so much debt that it will be difficult for them to add more debt to bail out banks, if derivatives become a problem
 - ▶ Derivatives were a problem in 2008
 - ▶ Likely to be a problem again