
Payden & Rygel

POINT of VIEW

SPRING 2015

Our Perspective on Issues Affecting Global Financial Markets

Pg 1 **RAISING YOUR STANDARDS: HOW MEASURES OF LIVING STANDARDS MISLEAD**

For years pessimists have worried that American living standards have stagnated. We dig deeper into the data underlying the argument and discover there is more than meets the eye. Cheer up, you may be better off than the statistics make you think.

Pg 5 **MODI-NOMICS: THE OPTIMISTIC CASE FOR THE WORLD'S THIRD LARGEST ECONOMY**

Does India, under new leadership, face a new dawn? Prime Minister Narendra Modi brings new economic policies and a wave of optimism to India.

Pg 10 **NOW HIRING: FROM FARMERS TO PROGRAMMERS**

University of Oxford researchers found that 47% of American jobs risk being replaced by computers. From loan officers to economists, your job (yes, you!) is probably next. But this has always been the case. Let us explain...

Pg 11 **THE ORIGINAL FLASH BOYS**

Think high speed, techy traders seeking out information and trading faster than the average Joe are new to the financial markets? Think again. The quest for speed and near riskless profit has been with us for centuries.

Raising Your Standards: How Measures of Living Standards Mislead

Everything is better today but almost nobody believes it.

Most people go around grumbling about “the cost of living,” whining about how “everything costs more,” complaining that “the dollar just doesn’t stretch as far” and worrying that “living standards have stagnated.”

Why the malaise? Because the “data” tell us that everything costs more, that the “dollar doesn’t stretch as far” and perhaps most importantly, that living standards have stagnated.

In what follows we will try to cast doubt upon such notions. Our best thinking: the published statistics mask the improvement in living standards. If we’re right, this should change the way you look at the data.

STANDARD STANDARDS: WHAT’S THE STANDARD WAY TO MEASURE LIVING STANDARDS?

Of all the measures of living standards, one reigns supreme: real (“inflation-adjusted”) median household income. It’s cited by the press and heralded as definitive evidence by those proposing the stagnation thesis.

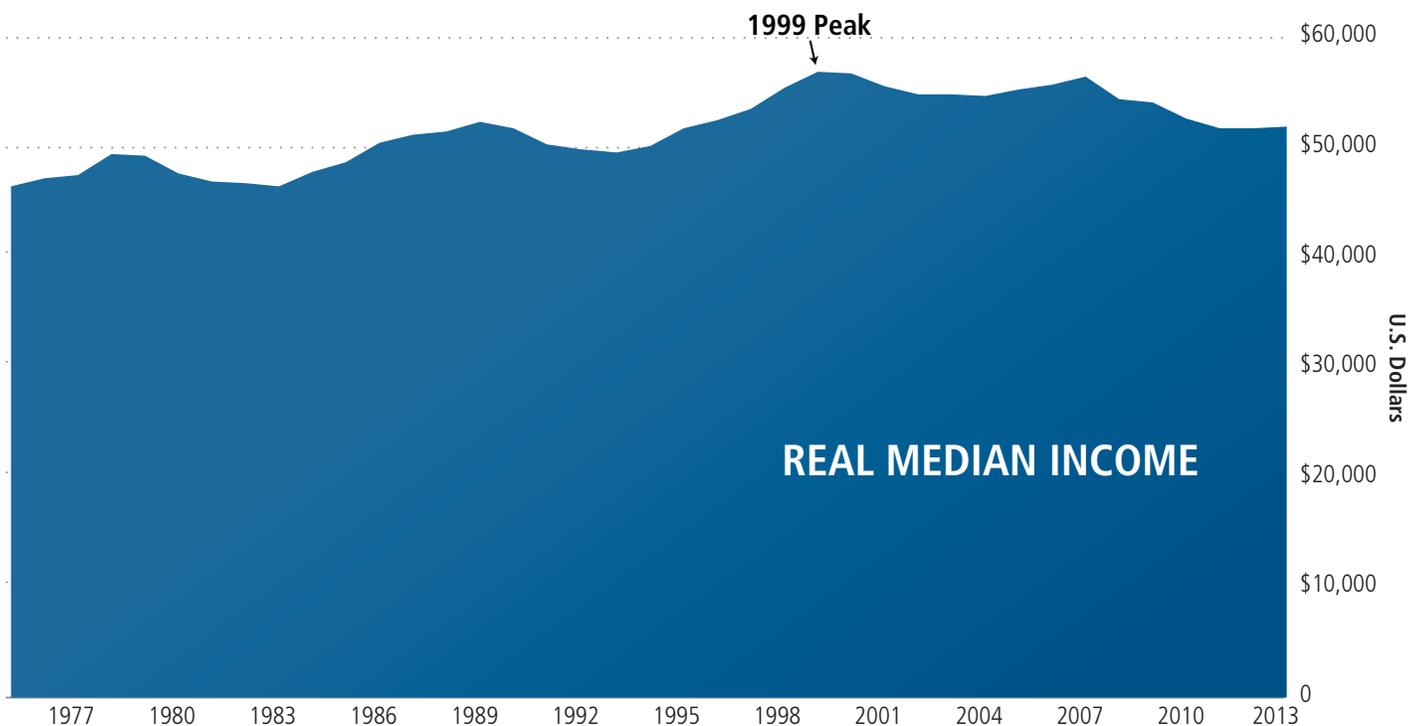
«OUR BEST THINKING: THE PUBLISHED STATISTICS MASK THE IMPROVEMENT IN LIVING STANDARDS»

And, as many have pointed out, median household income has stagnated. In 1999, at its most recent peak, real median household income reached \$57,000. By 2013, it fell to \$52,000 (see Figure 1).¹ Was the decline just a business cycle phenomenon? Did a weak economic recovery hold back real income growth?

Even over a longer time frame, income growth also appears stagnant. Since 1975, real median household income only rose 12%, hardly a sign of improvement and much slower than the pace of overall economic growth over the same period, which increased 208% in real terms.

As such, most have rightly concluded that this represents stagnation. Based on the standard data, we agree! But this measure has problems that make us weary of giving it the final word on such matters.

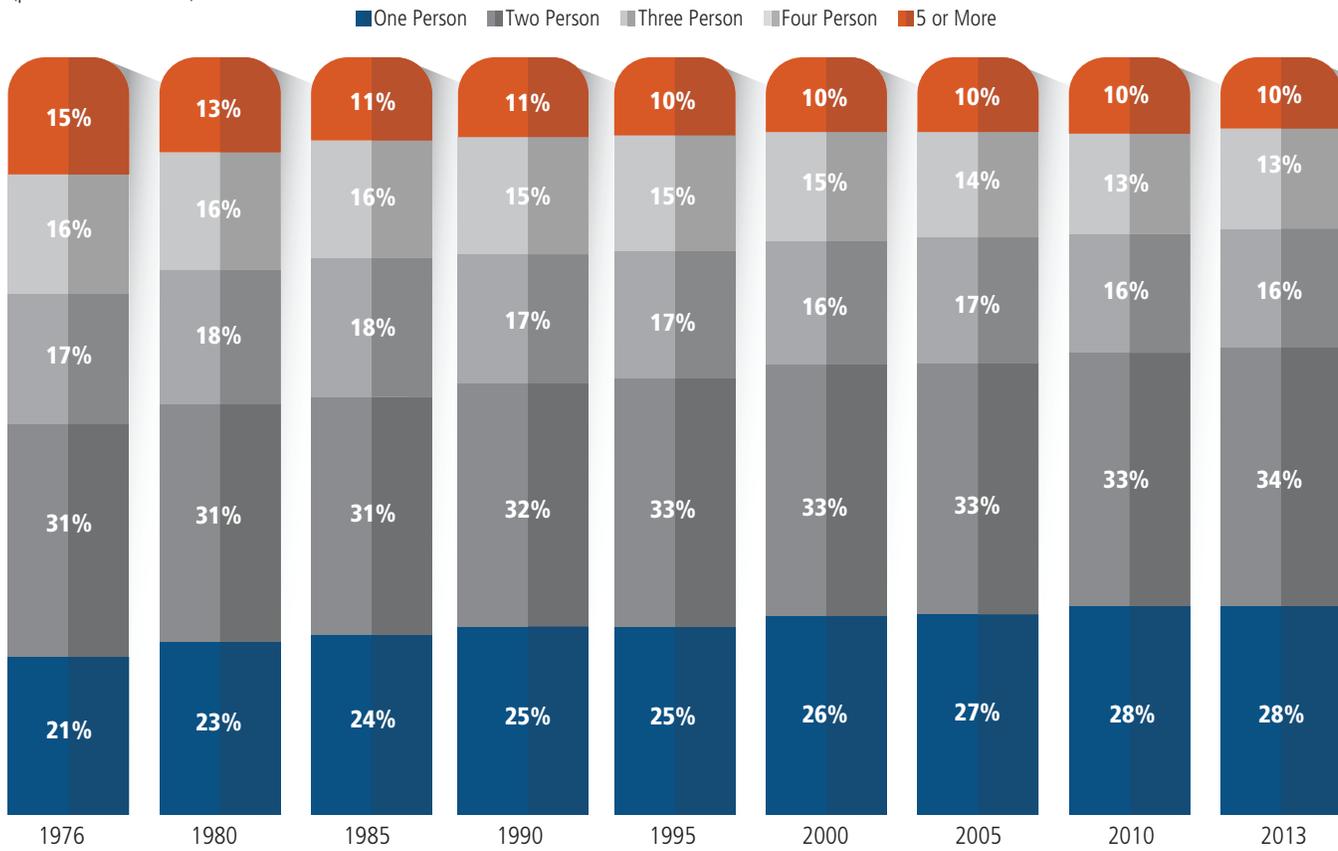
fig. 1 REAL MEDIAN HOUSEHOLD INCOME STAGNATION



Source: U.S. Census Bureau

fig. 2 HOUSEHOLD COMPOSITION HAS CHANGED: FEWER BIGGER HOUSEHOLDS, MORE SMALLER HOUSEHOLDS

Households by Size: 1976 to 2013
(percent distribution)



Sources: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement, selected years, 1976 to 2013.

Median household income has three components: first, there's the problem of what constitutes a household and how that evolves over time. Second, there are the sources of income and how they've changed with time. And, third, there's the inflation-adjustment. That is, how do you adjust income in dollars today to account for the fact that a dollar just doesn't buy as much as it did in 1976.

We'll tackle the three components in turn and argue that you ought to raise your standards: there are reasons to think things may not be as bad as many believe due to quirks in the statistics.

HEY, WHO ARE YOU CALLING A HOUSEHOLD?

Some may assume that calculating "household income" means tracking the progress of a household through time. Such a common sense vision could not be further from the statistical truth.

Instead, government number crunchers rely on a survey of American households conducted each March. According to the US Census Bureau, a household in this survey is officially "all the persons who occupy a housing unit". A "housing unit" can be a house, apartment, mobile home, or a single room occupied as a separate living quarters within a house. Ah, the confusion begins. If you had in mind a

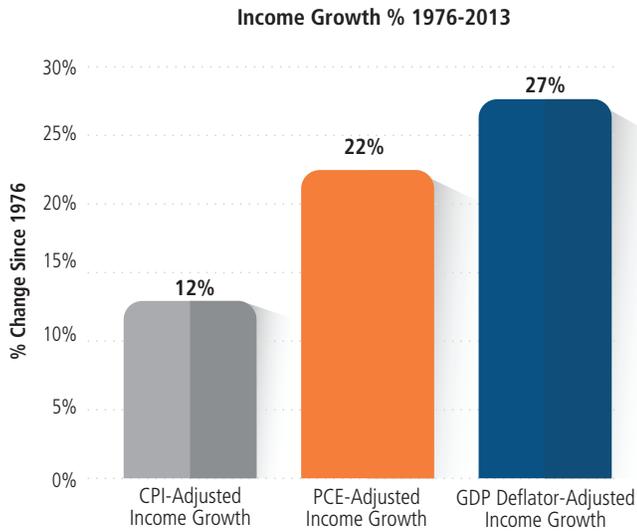
modest, middle class family living in a tree-lined suburban enclave in a home ringed with a white picket fence, snap out of it. A household is a statistical construct.

So if you survey 100 households in the US, you take the one household right in the middle and look at its income. By taking the median, "or the point that divides the household income distribution into halves, one-half with income above the median and the other [half] with income below the median," statisticians attempt find the true middle.² The purpose of looking at the median household's income (as opposed to the average) is to avoid skewing from outliers, like really wealthy households or very poor households.

«SINCE 1975, REAL MEDIAN HOUSEHOLD INCOME ONLY ROSE 12%»

But has the composition of households changed in the last few decades? What if those 100 households have changed, such that the middle household is quite different from the middle household of the 1970s. It turns out the answer is "yes" and the magnitude is fairly dramatic.

fig. 3 USING THREE DIFFERENT INFLATION METHODS, REAL INCOME GROWTH LOOKS VERY DIFFERENT



Sources: Bureau of Economic Analysis, Census Bureau, Payden & Rygel Calculations

The share of married couple households fell from more than 60% in 1980 to less than 50% in 2013. Meanwhile, the number of one-person households rose from 21% to 28% of households over the same period (see Figure 2 on page 2).³ The composition shift matters, since a two-person, married couple household tends to have higher household income. A dual-earner married households that becomes two, one-earner households lowers the overall “median household income” of each, even if the individuals’ income is the same. Before you had a combined household, now you have two households. As a result of this shift, average overall household size declined from 2.9 in 1976 to 2.6 in 2013.

In short, the rise of single-income households biases the overall median household income statistic and may explain—at least in part—the sluggish growth in median income over the time period. However you choose to slice it, a “median household” in 2013 looks different from the “median household” in 1976.

SHIFTING FORTUNES

The composition of incomes, too, have dramatically evolved. Income, as defined by the Census Bureau, is “income received on a regular basis before payments for personal income taxes, social security, union dues, medicare deductions, etc.”⁴ Also, the Census Bureau advises, there is a tendency to underreport household income in the surveys. Think about it: a stranger calls asking for your annual income, what would you say?

What a survey also leaves out is the growing portion of income attributable to social program transfers and health insurance benefits accrued outside of the standard wage and salary calculated income. These non-wage and non-salary income components have risen dramatically in the last few decades. For example, in 1976, government

transfers accounted for 4% of personal income. Today transfers account for more than 17% of total personal income.⁵

So are there other measures of income that might cast the overall compensation gains in a better light than the median household survey? Yes. The Bureau of Economic Analysis measures real personal income, which includes some of the non-cash benefits. Looking at average personal income instead of median household income, incomes actually grew 223% in real terms since 1976 instead of the more dismal 12% figure from median household income.

Of course, while some of the difference may represent a rise in income inequality over the period (Mark Zuckerberg drags up the overall personal income but does nothing to help the median household income figure), at least a portion is due to how income accrues to a household today and suggests that overall income gains are better than the median household statistic tells us.

DEFLATING A DOGMA

The third piece of the living standards puzzle is inflation. Once you question the fact that the median household has changed and that the sources of income accruing to that household have evolved, a final question remains: how do we adjust each dollar received by a household to account for changes in prices?

As it turns out, how you measure inflation heavily influences the median household income measure—perhaps more than any other factor.

“Wait a second,” you might say, “If anything the consumer price index (CPI) understates the true changes in my standard of living. Everything I buy is getting more expensive all the time!”

Yes, we hear this all the time. Inflation has been manipulated away by the statisticians sleight of hand. To a large extent we addressed this issue in another article (see the Point of View, Spring 2014 centerpiece, “Periodic Table of Prices: How Do They Calculate CPI”). The key: many of the items people often point to as rapidly accelerating in terms of price account for a small share of total spending (e.g., gasoline, milk).

The share of spending matters as it underpins the calculation of inflation. For example, the most famous inflation gauge is the Consumer Price Index, or CPI, tabulated by the Bureau of Labor Statistics, first surveys households and determines expenditure shares for different goods and services. The BLS keeps these shares fixed through time as the “consumer basket.” The CPI is then calculated as a weighted average by monitoring the monthly price changes of the 40,000 goods and services in the basket and multiplying by their share of consumer expenditures.

The goal is to be able to compare the cost of the same basket of goods and services through time. For example, a family in 2015 would need \$45,000 in household income to approximate the goods and services available to a family on just \$15,000 in 1976. The implication: the cost of living has tripled in the interim. This is “the rise in the cost of living.”

OUR SIMPLE OBJECTION

Such a calculation might work if the population was static and the number, type and quality of goods and services were the same. But the world changes. New goods and services emerge on a daily basis. Prices cause people to rethink purchases or alter consumption patterns. Ultimately this dynamism is not captured in the standard data.

In our view, the price index used by the Census Bureau probably overstates inflation and thus understates income gains, relative to a different price index. But, fortunately, two alternative approaches have been developed: the personal consumption expenditures (PCE) price index and the gross domestic product deflator. The alternative measures address many of our concerns. What would happen if we use an alternative measure to adjust for inflation instead? Doing so dramatically changes the story.

By using the alternative indexes to adjust for inflation, median income growth is actually much higher (see Figure 3 on page 3) than when the CPI is used to adjust income. CPI-adjusted real median household income rose just 12% from 1976 to 2013. However, PCE-adjusted median household income rose 22%! While the difference between

CPI and PCE in any given year is small, the difference adds up as the years accumulate. If the alternative inflation measures are more accurate, the difference in real income has been astounding.

BETTER THAN EVER

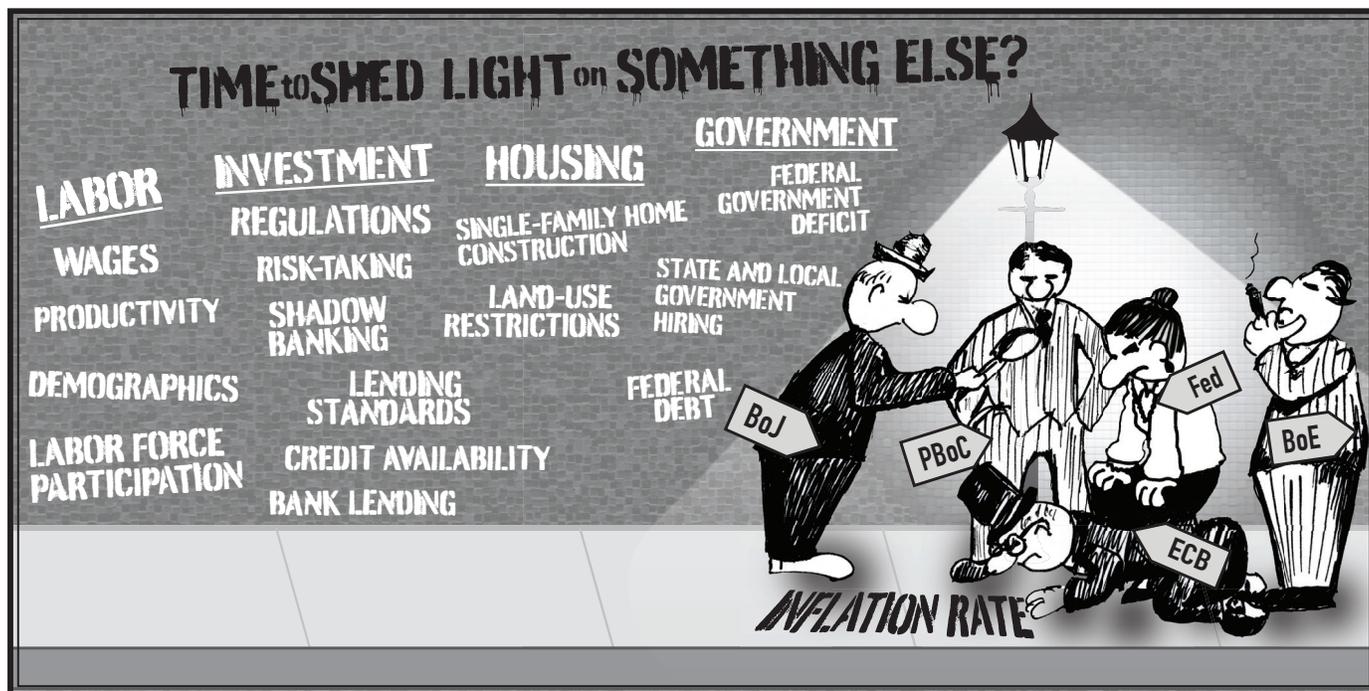
By thinking about the three major components—household composition, income sources and inflation-adjustments—it’s likely that the “real median household income” metric understates the actual rise in living standards over the last three decades. Alternative measures of income and inflation suggest we should be skeptical that the median household income statistic, as published annually by the government, is the final word on living standards.

Maybe it’s time to raise your standards? 

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- 1 Census Bureau, “Income and Poverty in the United States: 2013,” Issued September 2014.
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- 3 Ibid.
- 4 Ibid.
- 5 Bureau of Economic Analysis, “Personal Income and Outlays” report, January 2015.

ECON-COMICS



Modi-nomics:

The Optimistic Case for the World's Third Largest Economy

Narendra Modi, the son of a tea merchant, has quickly become one of the world's most talked-about leaders. But does he bring real change or is his election just another fanciful Bollywood love story for the 1.2 billion Indians living in the world's third largest economy?

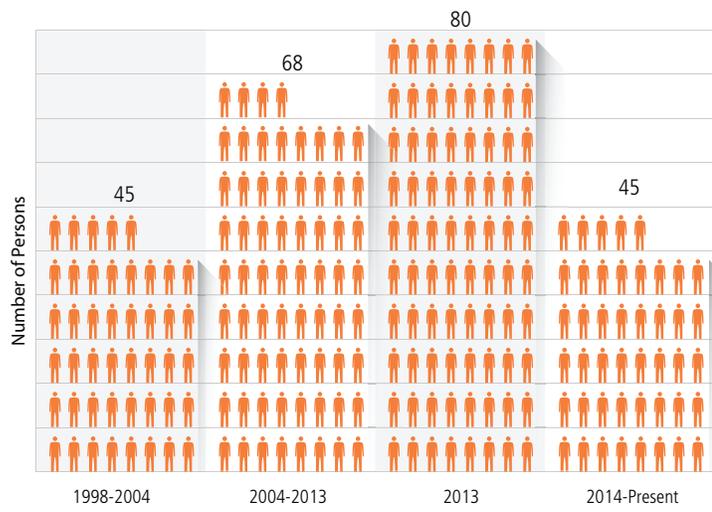
Nearing the end of his first year in office, Modi has cut bureaucratic inefficiency, made steps toward putting India's fiscal house in order, and advanced India's quest to become the next manufacturing hub of the world. While many of the benefits may arrive years down the road, we are optimistic that the reform momentum Modi personifies will thrust India forward and boost the country's economic growth prospects.

THE PERSONIFICATION OF HOPE

Modi swept to victory with an election campaign analogous to American President Barack Obama's in 2008. Modi used Twitter hashtags, 3D hologram appearances and catchy slogans to create the "Modi Wave," which swept the nation. Modi's calls for economic growth through "minimum government and maximum governance" resonated with young Indian voters.

Modi himself embodies the "Indian Dream." He rose to fame during his ten years as the Chief Minister (Governor) of Gujarat, the fourth

fig. 1 "MINIMUM GOVERNMENT, MAXIMUM GOVERNANCE": SIZE OF THE INDIAN "CABINET" OVER TIME



Source: India Today

«WE ARE OPTIMISTIC THAT THE REFORM MOMENTUM HE PERSONIFIES WILL THRUST INDIA FORWARD AND BOOST THE COUNTRY'S ECONOMIC GROWTH PROSPECTS»

largest Indian state (India has 29 states) by gross domestic product (GDP). During his tenure he provided 24-hour electricity access—a rarity in India that made the state a darling for industrialists. As a result, Gujarat grew 10% per year between 2004 and 2012, well above the Indian average of 8.25%.¹

Can he replicate his success in Gujarat for the rest of people of India?

MOVING THE BUREAUCRATIC BEHEMOTH

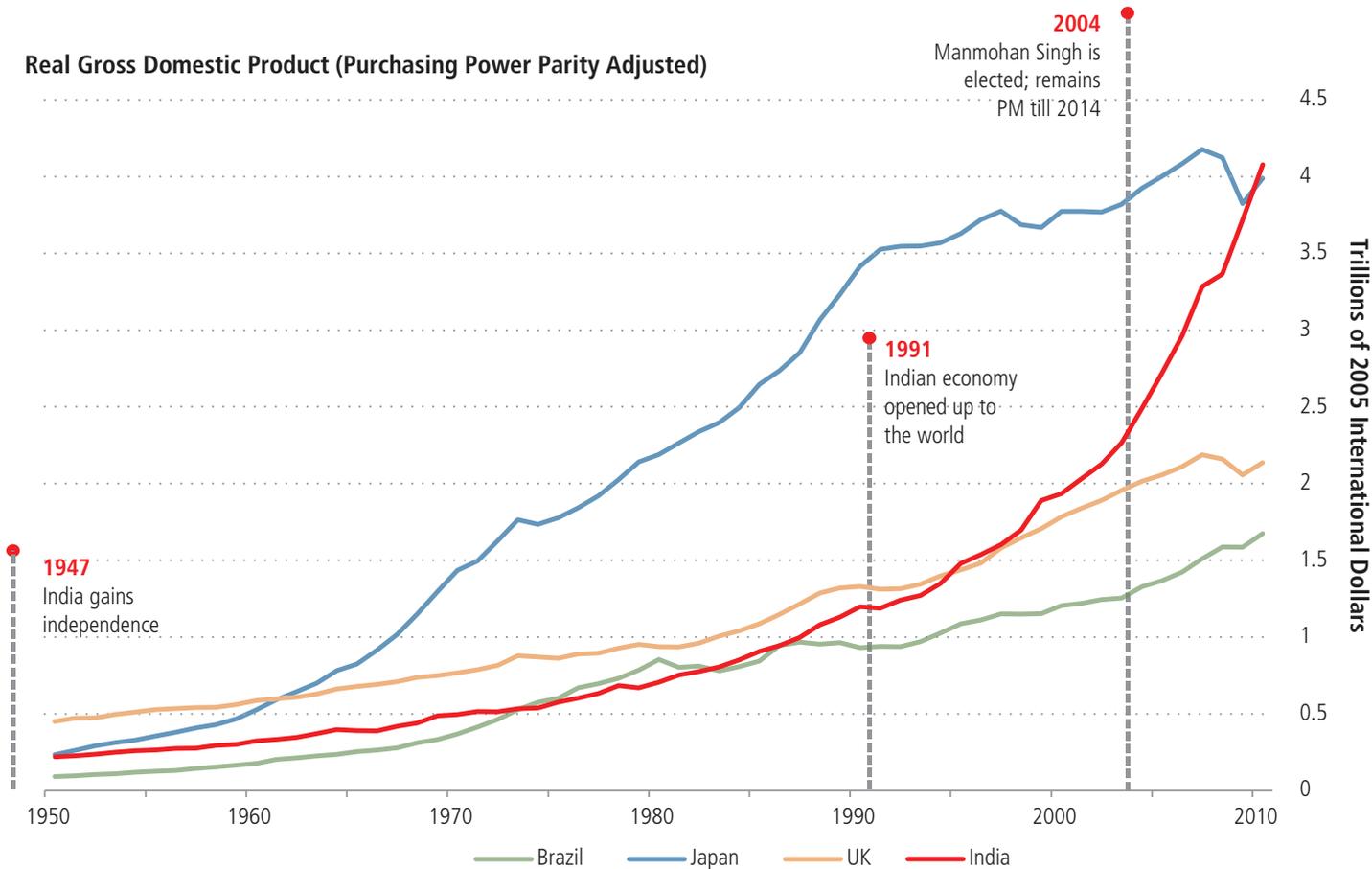
For decades India has been plagued by politicians who made election promises to rein in bureaucracy and increase efficiency but failed to deliver.

Using his political capital and reputation of "CEO-style" leadership from his days in Gujarat, Modi quickly inspired India's notoriously inefficient bureaucrats to work. As old files were thrown out and offices were cleaned, some agencies found files dating as far back as the time of British colonial rule.

Modi personally called ministers on their desk phones to ensure they were at work on time, and instituted a biometric "check in, check out" system for government employees that can be accessed by anyone in real time. The system has led to a morning rush of government employees at the Delhi Metro in a scramble to arrive at work on time.²

Modi also abolished around 30 committees that had been set up by the previous government to resolve disputes between ministries, a symbol of policy paralysis.³ Instead, his office and cabinet, the smallest in 16 years (see Figure 1), will resolve disputes directly and leave decision-making to the ministries themselves, without the burden of overarching groups and panels. These small, but meaningful steps in the central government were only given lip service by politicians until now.

fig. 2 INDIA OPENED UP ITS ECONOMY IN 1991 AND REAPED THE REWARDS... CAN MODI REPEAT HISTORY?



Source: Penn World Tables, The Economist

«IN 1990, THE AVERAGE INDIAN CITIZEN HAD SLIGHTLY MORE INCOME THAN THE AVERAGE CHINESE CITIZEN, AS MEASURED BY GDP PER CAPITA»

“COME...MAKE IN INDIA!”

In 1990, the average Indian citizen had slightly more income than the average Chinese citizen, as measured by GDP per capita. Today, China’s GDP per capita is more than double that of India’s. Manufacturing and export-led growth, which also made countries like Japan and South Korea prosperous, drove China’s economic miracle. Instead of reinventing the wheel, Modi has gone back to basics.

Modi’s economic reforms aim to make India the manufacturing hub of the world. However, half of Indian workers are still employed in low-paying agricultural jobs, and Modi knows that manufacturing jobs offer higher wages. A worker in manufacturing is 14 times more

productive than one in agriculture, and higher productivity brings higher wages.⁴ In order to bring these jobs to his nation, Modi aims to reform land and labor laws and increase inflow of capital via foreign direct investment to serve as the catalyst for his “Make in India” campaign.

Land acquisition problems have plagued producers and industrialists in India and is the primary hurdle in setting up new ventures. Under Modi, the government passed an executive order (an “ordinance” in India) to ease land acquisition in critical sectors, including power, housing, and defense, reinvigorating some of the \$300 billion in projects that had been held up due to the land acquisition laws.⁵

Furthermore, to signal seriousness in opening up the Indian economy further (see Figure 2), Modi passed two more ordinances increasing foreign firms’ access to insurance ventures and commercial coal mining, which the country relies upon to provide a majority of their electricity. By opening up to foreign competition, Modi seeks to provide electricity to the millions of Indians who still live in the dark and to the industries that will need a consistent supply of energy if they are to “Make in India”.

GETTING THE FISCAL HOUSE IN ORDER

India has balanced a budget at the federal level only once in the last 25 years. The previous government poured endless rupees into wasteful subsidies, and in one year, 2003, had a primary deficit of 5.5% of GDP. This fiscal deficit caused Standard & Poor's to give India a credit rating that is just one notch above "junk" status (India is Baa3/BBB-/BBB-, upgrade watch by S&P). Modi has the government on track to cut the deficit to 4.1% of GDP in 2015, but a budget surplus remains elusive. India has not posted a budget surplus since 2007.

How will the government control its spending problem? The answer lies in revenues and subsidies. In order to raise revenues, Modi promised to divest from state-owned enterprises. He started this with a 10% sale of the coal-mining giant, Coal India, raising funds to fill state coffers.

On the side of wasteful subsidies, Modi took advantage of the timing of falling oil prices to remove costly diesel fuel subsidies, which accounted for a quarter of the government's total subsidy bill. In order to be more efficient with the subsidies still being disbursed, the Indian government opened bank accounts for 18 million poor people (almost the population of the State of New York) in a week in order to make sure subsidies reach their destination. To date, they have opened 115 million bank accounts.⁶

WHAT NEXT?

We have here presented an optimistic case for India. But Modi's popularity and upstart presence alone are not enough to solve all of India's problems. For example, inflation, were it not for the decline in crude oil prices, might still be running too high.

Land acquisition problems, though worked on by Modi thus far, stand to face considerable opposition. And while a 4% budget deficit might be desirable compared to recent years, the central government still has a long way to go to balance the budget. Consider that the International Monetary Fund does not forecast a general government primary surplus over the next few years. The new government last month pushed out the date for a budget surplus to 2017, moving the budgetary goal posts once again.

As is the case with any democratic system, politicians do not win votes on nuance or plausibility. But, ultimately the history books will determine whether Modi's promises were substantive or just fanciful. Does he have the ability needed to execute on thorny issues like subsidies, land acquisition, and bureaucratic reforms? We will see.

After a great decade as Chief Minister of Gujarat, Modi hopes to replicate his efforts in New Delhi. With Modi at the helm, India has a renewed sense of hope for its economic future. 

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- 2 Shibaji Roychoudhury, "Biometric Babus", Scroll.in, October 7, 2014.
- 3 D K Singh, "Prime Minister Narendra Modi to shed UPA baggage", Indian Express, June 1, 2014.
- 4 Rajat Gupta et. al., "India's path from poverty to empowerment", McKinsey Global Institute, February 2014.
- 5 Nigam Prusty, "India clears order to ease land acquisitions in reforms push", Reuters, December 29, 2014
- 6 "With 11.5 crore accounts, Jan Dhan bags Guinness Record", Rediff Business, January 20, 2015.

NOW HIRING

University of Colorado researchers found that 47% of American jobs risk being replaced by computers. From loan officers to economists, your job (yes, you!) is probably next. But this has always been the case. Observers have worried for centuries about technological unemployment—the idea that the advent of new ways of production would eliminate the need for a human labor component.

From Farmers to Programmers

It is true: the US job market looks nothing like it did 50 or 150 years ago. We looked back to 1869 and found an American economy dominated by farmers. **85%** of all employment in the Civil War era was in the agriculture sector.

Today, despite an eight-fold increase in mouths to feed, the agriculture sector accounts for just **1%**. But we haven't run out of food. Interestingly, agriculture **produces 140 million times more food**. With a much smaller segment of the population farming, we produce vastly more food. What happened was we figured out how to make food production routine and automated.

The same is true of manufacturing. Goods-producing jobs account for just **14%** of all employment today. Today, we have more people and **400% more** of the amount of stuff we produce each year. So what do people do today if they aren't farming or building cars? Services. **85%** of all employment is in services, everything from web developers to artificial limb fitters, according to the list maintained by the Bureau of Labor Statistics.

Yes, job automation will replace the human component. But all that seems to have done is free up human creativity to do other things. As the last 150 years have demonstrated, human creativity has been unleashed to accomplish tasks and perform jobs unimaginable in 1869 or even 1989. Such is the nature of economic change.



Percent of U.S. Employment by Sector

Services

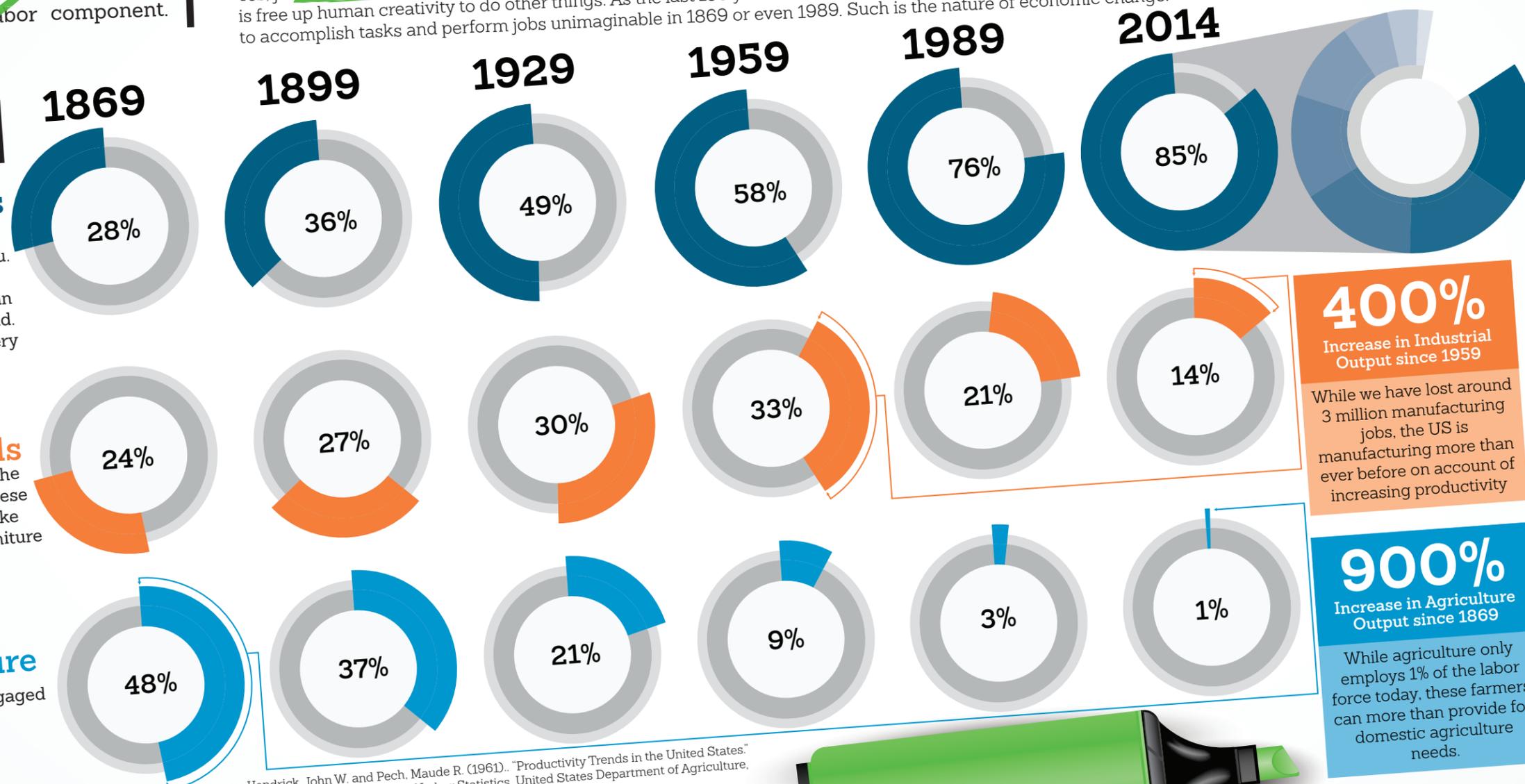
Service-providing jobs create the intangible things around you. The barber provides you with a haircut, but that service is not an object you can hold in your hand. This includes jobs to sell the very things provided by the goods-producing sector.

Goods

Goods-producing jobs create the tangible things around you. These jobs produce tangible things like cars, TVs, coal, lumber for furniture and the furniture itself!

Agriculture

This includes workers engaged in growing our crops and livestock.



Composition of Service Sector in 2014

- 22% Trade, Transportation & Utilities
- 18% Government
- 18% Education & Health Services
- 16% Professional & Business Services
- 12% Leisure & Hospitality
- 7% Financial Activities
- 5% Other
- 2% Information

400%
Increase in Industrial Output since 1959

While we have lost around 3 million manufacturing jobs, the US is manufacturing more than ever before on account of increasing productivity

900%
Increase in Agriculture Output since 1869

While agriculture only employs 1% of the labor force today, these farmers can more than provide for domestic agriculture needs.

WOW!

Sources: Kendrick, John W. and Pech, Maude R. (1961). "Productivity Trends in the United States." NBER, General Series no. 71. Bureau of Labor Statistics, United States Department of Agriculture, Federal Reserve, Payden & Rygel Calculations

The Original *Flash Boys*

It isn't every day that arcane economics and finance topics make the nightly news. But with the release of Michael Lewis' *Flash Boys* book last fall, the finer points of capital markets transactions appeared in the mainstream press. Discussions centered on the ethics and propriety of certain high-speed traders and market-makers who compete with the use of extremely fast computers to detect (and trade on) price discrepancies in global financial markets.

We write neither to condemn nor condone today's high-frequency traders. We only hope to show that the creative, if questionably legal, spirit behind such tactics are not unique in the history of finance. Since Hammurabi, traders of all ages worked on the cutting edge of communication inefficiencies in search of monetary gain.

DID YOU KNOW?

What is Arbitrage Anyway?

Before we get too specific, a bit of history is in order. Historically, we find the first published usage of the term "arbitrage" in the 1704 French accounting textbook *La Science des Negocians et Teneurs de Livres* (The Science of Merchants and Accountants). Clever research shows that the term appeared in a discussion of "the relationship between exchange rates and the most profitable locations for issuing and settling a bill of exchange."¹

For our purposes here, arbitrage will take the broader meaning of "buying and selling of the same product in different markets – at the same [or nearly the same] time and with little risk of loss."²

By surveying select instances of arbitrage—the technical term for exploiting price differences in the same good across different markets—we hope to provide a deeper appreciation for the ways financial market participants over the years have used the best technology of their era to skim profit off the top of normal trades and/or make pricing more efficient.

THE USES AND MISUSES OF ARBITRAGE

Ok, you might be saying, if this were so easy and so riskless, and so widespread, how does it continue? The truth is, arbitrage opportunities are rare precisely for this reason. The bottom-up discovery process wrought by myriad market participants hunting around for ways to make money leaves few, if any, of these "free-lunch" opportunities unexploited for long.

«WE WRITE NEITHER TO CONDEMN NOR CONDONE TODAY'S HIGH-FREQUENCY TRADERS. WE ONLY HOPE TO SHOW THAT THE CREATIVE, IF QUESTIONABLY LEGAL, SPIRIT BEHIND SUCH TACTICS ARE NOT UNIQUE IN THE HISTORY OF FINANCE»

The social uproar generated by *Flash Boys* and the controversy surrounding high-frequency trading share important similarities with their predecessors. In what follows, we catalogue historical instances of financial market arbitrage. In the majority of cases, advances in communication technology aid and abet the work of traders as they scour the earth for profit.

HISTORICAL ADVENTURES IN ARBITRAGE: A SERIES OF CASE STUDIES

Case Study One: Mediterranean Mischief in Precious Metals

Date: ca. 480-404 BCE

The trade: Even in ancient Persia and Athens, currency took the form of gold and silver coins. Despite being relatively easy to transport and modestly difficult to counterfeit, coins were nevertheless traded actively, as merchants sought to exploit valuation discrepancies across regions.

«BROTHERS ALWAYS FIND A WAY TO CAUSE TROUBLE. NO LESS WAS TRUE FOR THE TWINS FRANCOIS AND LOUIS BLANC»

At the time, Persia depended on a coinage system which used both gold and silver. The Persian emperor was the only one legally allowed to coin gold, while he “granted [the authority] of striking silver coins to his regional delegates.”³ Silver would trade at a fixed ratio to gold (at 13 ½ to 1). So how did the arbitrage work?

In the Persian system, silver was undervalued relative to gold. To make a profit, traders would export silver from Persia and trade it for gold elsewhere in the Mediterranean - especially in Greece. Such arbitrage was highly profitable and practiced for centuries, in part because of the time it took information to travel.⁴

Case Study Two: French Government Bonds in Amsterdam and Frankfurt

Date: ~1760 to 1780

The trade: Despite the political turmoil in France in the late eighteenth century, financial markets were as active as ever. As relayed in the colorful journals of Giacomo Casanova, opportunities abounded in early modern Europe for financial market arbitrage. (As an aside, Sr. Casanova was a trader, secretary, Venetian soldier, escaped prisoner, preacher, alchemist, gambler, violinist, lottery director, and a spy.)

In one particular case, Casanova offered up the cunning strategy of “sell[ing] French government bonds ‘to an association of brokers at Amsterdam, and tak[ing] in exchange the securities of any other

country whose credit was higher than that of France.”⁵ Such a transaction gave the trader (Casanova) receiving the higher credit securities a safer and more valuable stream of cash flows (the other government bond) at a lower price.

Casanova also described a simple gold price arbitrage. This strategy, admittedly more involved than the aforementioned government bond swap, involved a complex array of news sources positioned around Europe reporting gold prices from various markets (e.g., Venice, Antwerp, London, etc.). When markets fell gravely out of alignment, Casanova would simply charter the speediest stagecoach he could find and hightail it to the exchange with the higher price to sell gold.

Case Study Three: The Blanc Brothers and the Chappe telegraph between Paris and Bordeaux

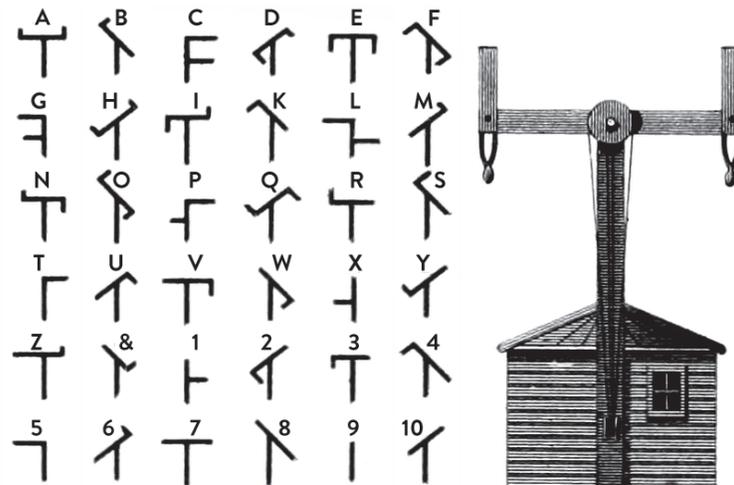
Date: ~1834

The trade: Brothers always find a way to cause trouble. No less was true for the twins Francois and Louis Blanc. Known in their day as “brilliant financiers” and bankers, they were also preeminent arbitrageurs who used the latest in communication technology to arbitrage security prices.

In 1834, the fastest way to communicate over long distances was a Chappe telegraph. A precursor to the electrical telegraph, Chappe’s semaphore telegraphs transmitted messages using telescopes to observe the positions of various panel and arm configurations (see Figure 1 on next page). Specific panel configurations were associated with specific meanings, and thus messages could be shared.⁶

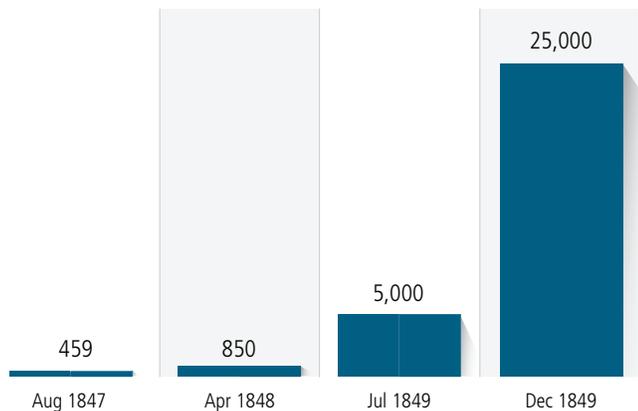
While far from speedy, these novelties allowed for information to travel much faster than possible with post horseback riders. For the Blanc brothers, sending and receiving news from Paris to Bordeaux by mail

fig. 1 19TH CENTURY TEXT MESSAGE? THE CHAPPE SEMAPHORE ALLOWED COMMUNICATION OVER GREAT DISTANCES



Source: Wikipedia

fig.2 49ERS FLOCK TO PROMISE OF GOLDEN PROFITS:
THE POPULATION OF SAN FRANCISCO



Source: San Francisco Genealogy

stagecoach took five days. With a Chappe telegraph, they could move information in a matter of hours.

But there were three problems. First, only the French government possessed a Chappe telegraph machine. Second, the government did not allow private use of its technology. Third, non-government messages would quickly be detected as suspicious.

Undeterred in their relentless pursuit of trading riches, the Blanc brothers devised a scheme to solve all three problems and transmit

security price information from Paris to Bordeaux clandestinely through the Chappe system. Working covertly, the brothers embedded errors in the legitimate messages sent by the government. These messages were illegally intercepted by an agent working for the brothers and the pattern of errors (ignored by the officials) was decoded for the security price information it contained. With advance knowledge of prices in hand, the brothers would trade profitably in Bordeaux.

The method worked for a few years until the French government discovered the practice and banned the Blanc brothers.⁷

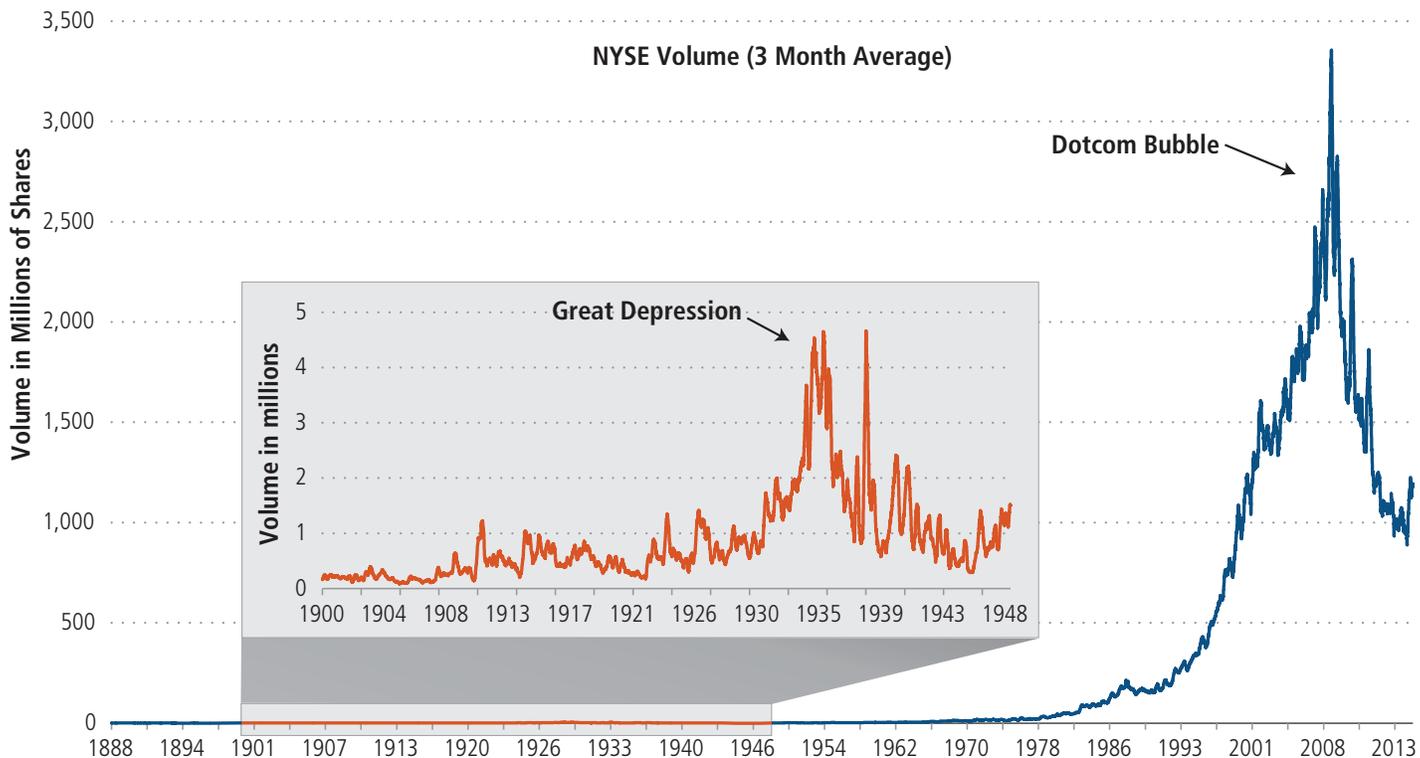
Case Study Four: Gold Dust in San Francisco and Philadelphia

Date: ~1849

The trade: In 1849, thousands flocked west to California in the hopes of striking it rich in a massive gold rush (see Figure 2). And riches indeed were to be had, not least for the arbitrageurs.

According to periodicals at the time, in San Francisco abundant supply (and the prospect of more) sunk the gold dust price per ounce to \$16.00. However, the going price per ounce of gold dust at the Philadelphia mint was \$18.05. Brokers and traders communicated across the United States using telegraphs, working the price difference by buying as much gold as possible in San Francisco and selling as much as possible in Philadelphia.

fig.3 INCREASED VOLUME: THE SOUND OF MARKET EFFICIENCY?



Source: New York Stock Exchange

To make good on the trades, the arbitrageurs had to factor in some costs. Indeed freight, insurance and other sundry charges totaled \$0.92 per ounce. After deducting these charges, the mid-19th century US gold trader could have made “\$1.13 [per ounce], or 7 percent, not a bad return for a relatively effortless transaction.”⁸

Case Study Five: Datek and NASDAQ

Date: ~1990

The trade: Long before *Flash Boys* and the investigation of 21st century computerized trading led by US television news magazine 60 Minutes, high-frequency traders of earlier generations were already keeping busy. This was especially the case for Datek Securities, a small trading firm based in New Jersey, which worked through the NASDAQ stock exchange system to find different quotes on different markets at the same time.

Here is how it worked: unlike a traditional stock exchange, the early digital incarnations of NASDAQ allowed “market makers [to] be physically located anywhere: the ‘floor’ is implemented in a fault-tolerant computer system [sic] collocated in Trumbull (Connecticut) and Rockville (Maryland).”

In the NASDAQ system, various market makers post their prices in the form of bid/ask spreads for different securities. “The idea is that market makers compete with each other to offer the best price to customers: the actual buyers and sellers of stocks.”⁹

Datek, though, developed software called “the Watcher” which allowed them to profit from the discrepancies in price for the same security offered by different market makers using the NASDAQ system. In the SEC’s words: “The Watcher system gave Datek Securities traders a significant time advantage because they received last sale and quotation update information before other market participants . . . [and] enabled Datek Securities traders to react more quickly to market activity.”¹⁰

Why quote the SEC? Well, some years later the regulatory agency found Datek guilty of violating anti-fraud and reporting statutes. As has been the case across history, the line between legal arbitrage and illegal arbitrage is very blurry, and often defined only after the fact

SOME THINGS CHANGE, SOME STAY THE SAME

As financial and communication technologies progress, opportunities and frustrations with arbitrage are inevitable. Just recently, the SEC reviewed its own process for posting public information to the internet because some market participants gained faster access (an average timing advantage of about 10 seconds, an eternity for the fast traders).¹¹

Our historical review shows that people in any era look for ways to make a quick profit. These characters will always exist. Investors today should count themselves lucky, though. As global trading volume has exploded, market pricing has become vastly more efficient (see Figure 3).

All of the characters on display in the case studies detailed above depended on cunning, faster information access, and the pursuit of profit. Any arbitrageur, past, present or future, who plies her trade shares a long lineage. 

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