Chapter 25
History of Macroeconomics

Macroeconomics as its own distinct branch of economic thought came into wide-spread existence during the Great Depression of the 1930's. The unemployment rate in the U.S. reached a record high of 25% during that decade, inflation was persistently **negative** during much of the 1930's (as Figure 89 shows), and the growth rate of GDP plunged dramatically (as Figure 90 shows). Neither fiscal policy nor monetary policy was able to do much to mitigate the sharp and widespread impact of the steep and long-lasting downturn. Indeed, there was not much "fiscal policy" to speak of, as Figure 91 reveals.

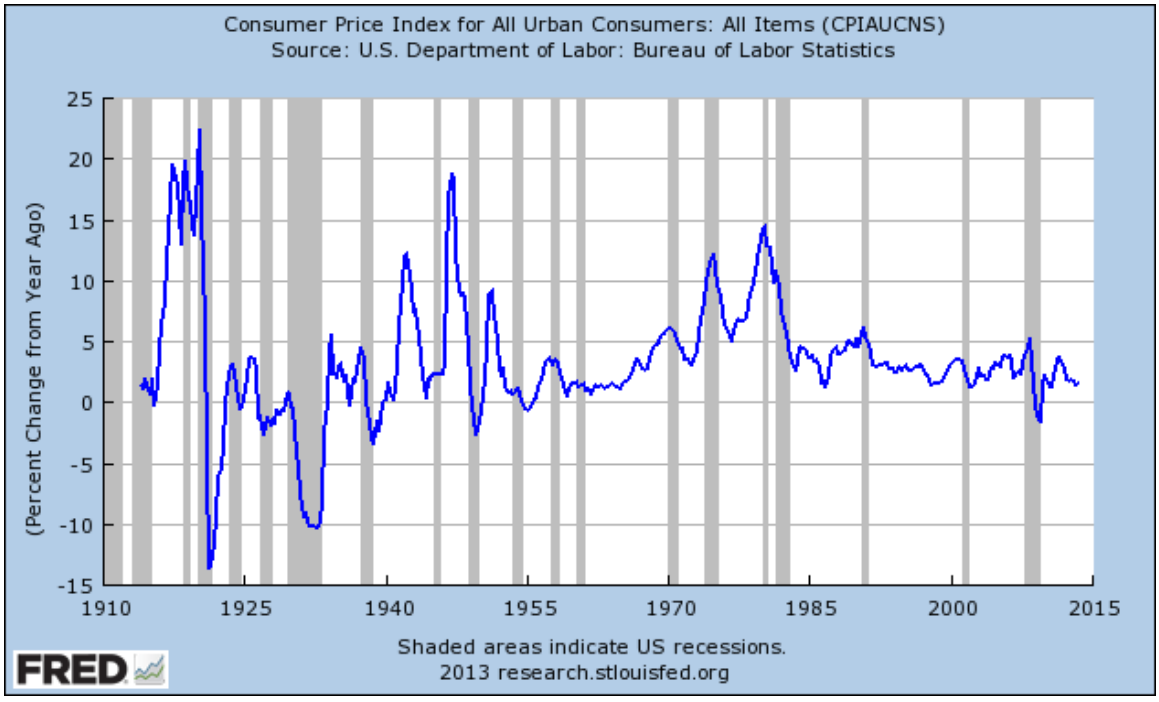

Figure 89. U.S. annual inflation rate, 1929-2013, as measured by the Consumer Price Index. Source: FRED.

What follows is an admittedly brief and partial history of macroeconomics. Other scholars of economics or history may have different interpretations of the events described below. Despite the brevity of the ensuing historical recap, the main point is to provide a glimpse into the evolution of thought about economy-wide events over the past century, and, importantly how chains of thought over the decades have led to the current frameworks used today to provide policy advice and continuing economic research. The taxonomy of this short history is categorized into four "phases."

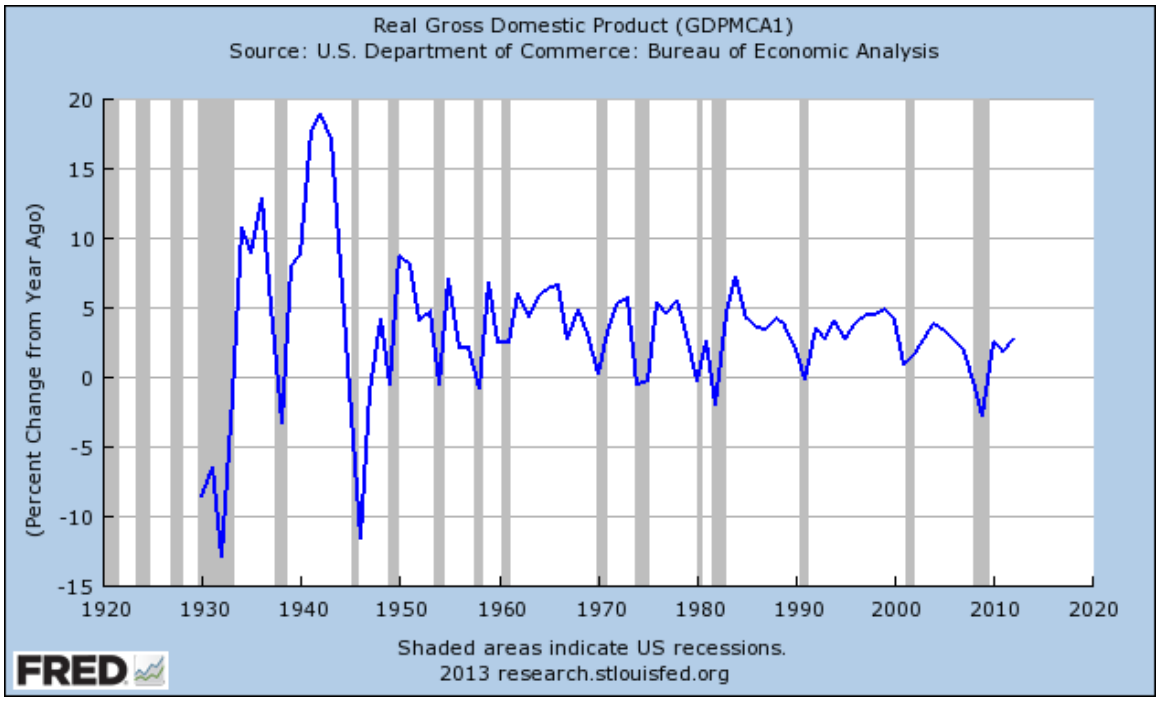

Figure 90. U.S. annual GDP growth rate, 1929-2013. Source: FRED.

Phase 0: The Panics of the 1800's

The Great Depression was by no means the first downturn in U.S. nation-wide economic activity. There had been many waves of "booms" (economic expansions) and "busts" (economic contractions) prior to the Great Depression. A few examples before the Depression are the Panic of 1873, the Panic of 1893, and the Panic of 1907, which you may have studied in an American History course. As far as historical records indicate,

there was very strong GDP growth in between these "Panics," but this growth was largely washed away during the sharp, but brief, Panic-induced downturns.

What were the Panics, and how did they arise? To consider this, we have to remember that the U.S. economy was heavily agriculturally-based in the mid-to-late 1800's and the early 1900's. The percentage of workers in the agricultural sector around the turn of the 20^{th} century was about 50%; in contrast, in the 2010's it composes no more than 1%-2%.

Given the farming-based U.S. economy, agriculturists often needed to **borrow** in order to fund themselves during out-of-season periods. This need arose because many crops could only be harvested during particular months or weeks of the year. Even then, the **quantity and quality** of the crop yield could heavily depend on the weather before harvest season – was it too rainy of a season? Too dry of a season?

Regardless, come harvesting time, the bounty of crops was picked and then delivered (think of wheelbarrows and wagons and vendors on the streets) to town or county markets. This was the **supply** side of that particular crop's market. There were also people and families that wanted to purchase these items, which was the **demand** side of that particular market.

The **prices** that emerged in these markets depended somehow on the quantity and quality of the items supplied. Nonetheless – and very importantly – the sale of these crops provided the farmers and their families' **revenue – that is, income –** which in turn would be available to be spent on households' needs.

However, in out-of-season times of the year, when there were no crops to harvest and sell, some or perhaps many farming families could run short or completely run out of the income they had raised during the previous harvest season. What this in turn implied was a **natural need for borrowing:** a family could borrow from willing lenders to meet their expenses during out-of-season times, and then repay their debts, inclusive of interest, when harvested crops were sold on markets. Such a setup is perfectly rational.

More and more willing lenders began sprouting up. Among these were **"speculative" lenders,** who offered very low interest rates. Their reasoning for offering low-interest rate loans goes along the following line. Some fields were left fallow so that the soil and earth can re-fertilize after a crop season. To incentive farmers to **not** leave fields fallow, these speculative lenders provided cheaper loans, with the expectation that the fields that in principle should have remained fallow would yield bounty. If this occurred, then lenders would receive a higher total repayment, due to the larger revenue raised by the farmers.

From the point of view of agriculture, cultivating fields that should have remained vacant could be considered a risky endeavor. If these "extra harvests" did not eventually materialize, then the farmers who "overborrowed" would not be able to repay their debts and hence fall into **bankruptcy.** If many farming families' extra harvests did not grow –

due to, say, inclement weather, which does not hit only one farm, but many farms in a particular geographic area – then there would be **many** bankruptcies.

As an aside, from the point of view of **economics,** however, the "overborrowing" due to low interest rates need not be viewed as irrational. Why? Because the farmers **willingly chose** to take on more debt – willingly "overborrowed" – because of the lower interest rates offered. They were not forced to borrow more, but rather were incentivized due to low interest rates.

The various Panics were thus largely tied to big swings in conditions in financial markets, which were heavily dependent, to put it simply, the quality and quantity of harvests. Digging a bit deeper, they were tied to huge ups and downs emanating from newly-created banking and lending markets, as well as newly-developing (and ultimately short-lived) currencies. One prime example of a short-lived attempt to revive bimetallic currency (gold and silver) was the ill-fated "Free Silver Movement" of the late 1800's and early 1900's, during which 1896 Presidential candidate William Jennings Bryan made his famous "Cross of Gold" speech, advocating the use of silver, in addition to gold and states' own currencies, as a medium of exchange. It was not until after 1913, the year the Federal Reserve System was created, that all the U.S. states shared one unified currency.

Thus, the seeds of the idea of sharp swings in **economy-wide aggregate outcomes** – that is, in **macroeconomic outcomes,** parlance that was little used then – was planted before the largest and longest-lasting **PANIC** of all.

Phase 1: Measuring Macroeconomic Activity (1930's - early 1950s)

It was the very long-lasting and very deep economic **"panic"** of the Great Depression that led to the emergence of the branch of economics that we now know as "macroeconomics." The causes of the Great Depression are typically thought to be financial in nature (indeed, Ben Bernanke, the Chairman of the Federal Reserve from 2006-2014, is one of the leading economic scholars of the Great Depression). It should be noted, however, that virtually all scholars of the Great Depression seem to agree that the cause was **not** the spectacular Stock Market Crash of 1929.

In the early stages of the Depression, the idea that the national government **could and should regulate** the periodic ups-and-downs of the economy rose to prominence. John Maynard Keynes was the most forceful and persuasive proponent of this idea (but by no means the only), describing it in his tome published in 1936, *The General Theory of Employment, Interest, and Money*. The basic tenet of what soon was dubbed the "Keynesian view" was that various "rigidities" plague market transactions, which lead to potentially long-lasting **disequilibrium** outcomes.

The clearest way to understand Keynesianism (which we will study in more depth later) was that **nominal wages and/or prices** may not adjust quickly enough to clear quantity supplied and quantity demanded. Hence, Keynesian logic demands that the **government should and is able to** (the latter because of slowly adjusting nominal prices) aid the economy.

In order to do so, there needed to be some U.S.-wide measures of the performance of markets; until the Great Depression, there were none. The system of GDP accounting that we more or less still continue to use began during the Great Depression. The **concepts and measurements** of "aggregate GDP" and "aggregate consumption" and "aggregate investment" that we now take for granted in the typical basic-macroeconomics-class GDP accounting equation were essentially **invented** during the Depression.

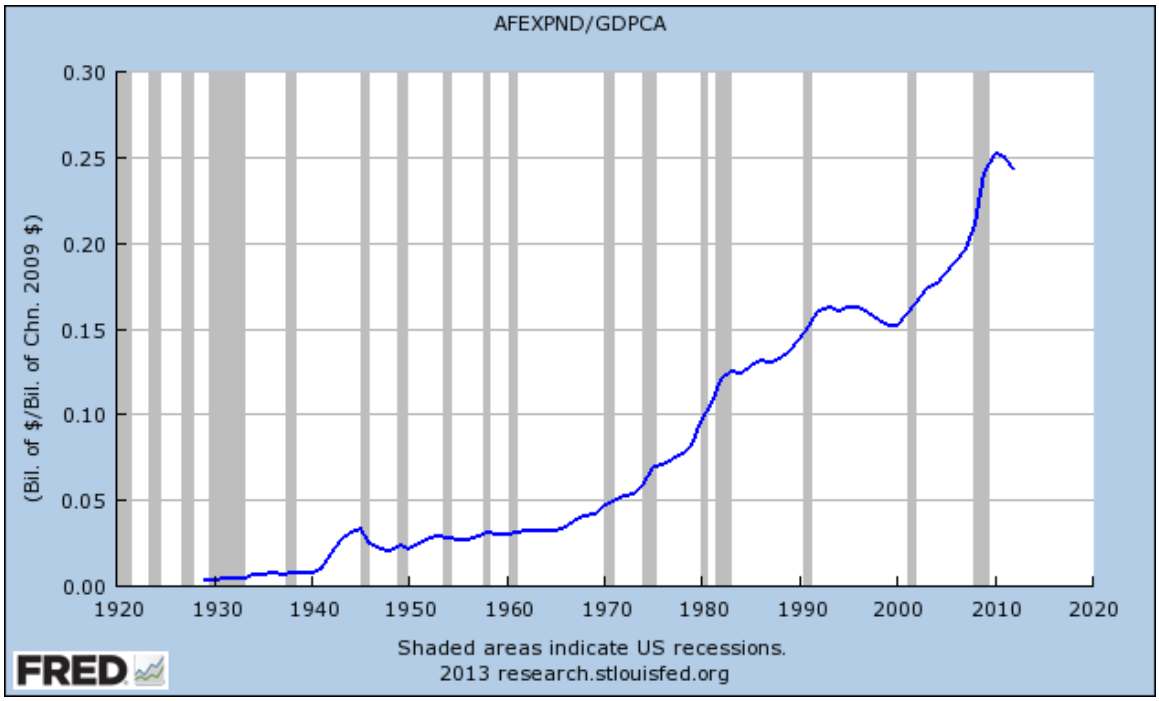

Figure 91. The share of government spending, excluding government investment expenditures, as a percentage of aggregate GDP, 1929-2013. Source: FRED.

The first attempts at the Keynesian policy prescription for the government were to increase national government spending, the "G" term in the GDP accounting equation. It may be surprising to hear, but measured federal government spending pre-Great Depression was essentially zero. Figure 91 displays the share of U.S. federal government

spending in total U.S. GDP – G/GDP rose from zero to about one percent during the course of the 1930's, and then spiked higher to about four percent when the U.S. entered WWII.[221]

Perhaps coincidentally, by the mid-1940's, economists had collected and tabulated about 15 years of quarterly data (roughly 60 time periods) on what now are considered "standard macro measures" often used to judge that society's standards of living. Simple sketches, like the illustrative Figure 92 (which is not based on actual data), convey two basic ideas. First, in the long time horizon, there is a steady upward march of GDP, and hence of individuals' standards of living.[222] But this upward march is not at all smooth – there are many ups and downs along this long-run path.

By no means did this happen immediately, especially because members of society, including economists, were nowhere near as hyper-connected to each other as now. But as the measurements of collected macroeconomic data (not simply the sketch like in Figure 92, but further statistical measurements of correlations, standard deviations, and so on) seeped into the thinking of many economists and policy makers, a main question emerged. The question was how to logically, analytically think about economy-wide events, such as depicted in Figure 92.

More precisely, should there be **one unified framework to consider both long-run growth and business-cycle fluctuations** – that is, the ups and downs – of the economy?

Somehow, the convention arose that the answer to this question is **no.** This convention did not **have** to arise amidst all of the discussions and debates between many macroeconomists, but it did. This conventional view has more or less survived to today.

More precisely, the convention arose that economists could study the smoothly-growing long-run component of the economy **separately from** the business-cycle fluctuations. Research economists and policy-minded economists to this day essentially continue to consider them as two different branches of economics. Understanding, both empirically and theoretically, the long-run growth component is often referred to as the branch of **economic growth** or **economic development;** understanding the shorter-run fluctuations of the economy is almost universally referred to as the branch of **macroeconomics.**

[221] The percentage has continued to increase over the decades, piercing 20 percent over the last several years. Much of this can be attributed to ever-increased benefits provided by the government to U.S. citizens. Leading examples are the Social Security System, Medicare, and Medicaid – the first began in the "New Deal" era of President Franklin D. Roosevelt, and the second two began in the "Great Society" period of President Lyndon B. Johnson.

[222] At least for the so-called advanced economies, such as the U.S., much of Western Europe, Japan, Canada, and Australia.

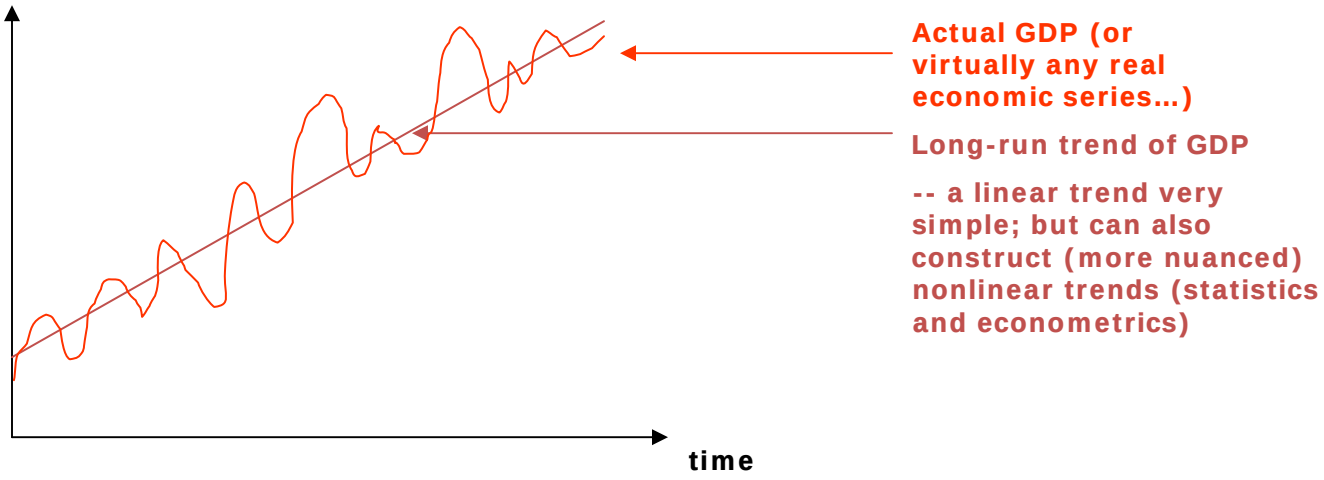

Figure 92. An illustration of fluctuations across time of real economic outcomes (for example, real GDP).

The focus of our analysis will be almost entirely on this now more-precise definition of macroeconomics – the hows and whys of macroeconomic fluctuations in the short-run around the smoother longer-run growth trend.

Figure 93, which builds directly on Figure 92, graphically displays the business-cycle component of real GDP (which could be generalized to other real quantity measures). The methodology of how to "filter" actual economic time-series data is left to more advanced courses in statistics and econometrics. The takeaway message is that the bottom panel of Figure 93 explicitly focuses on the business-cycle fluctuations and effectively ignores mechanisms that ignite long-run growth.[223]

[223] But more on this later.

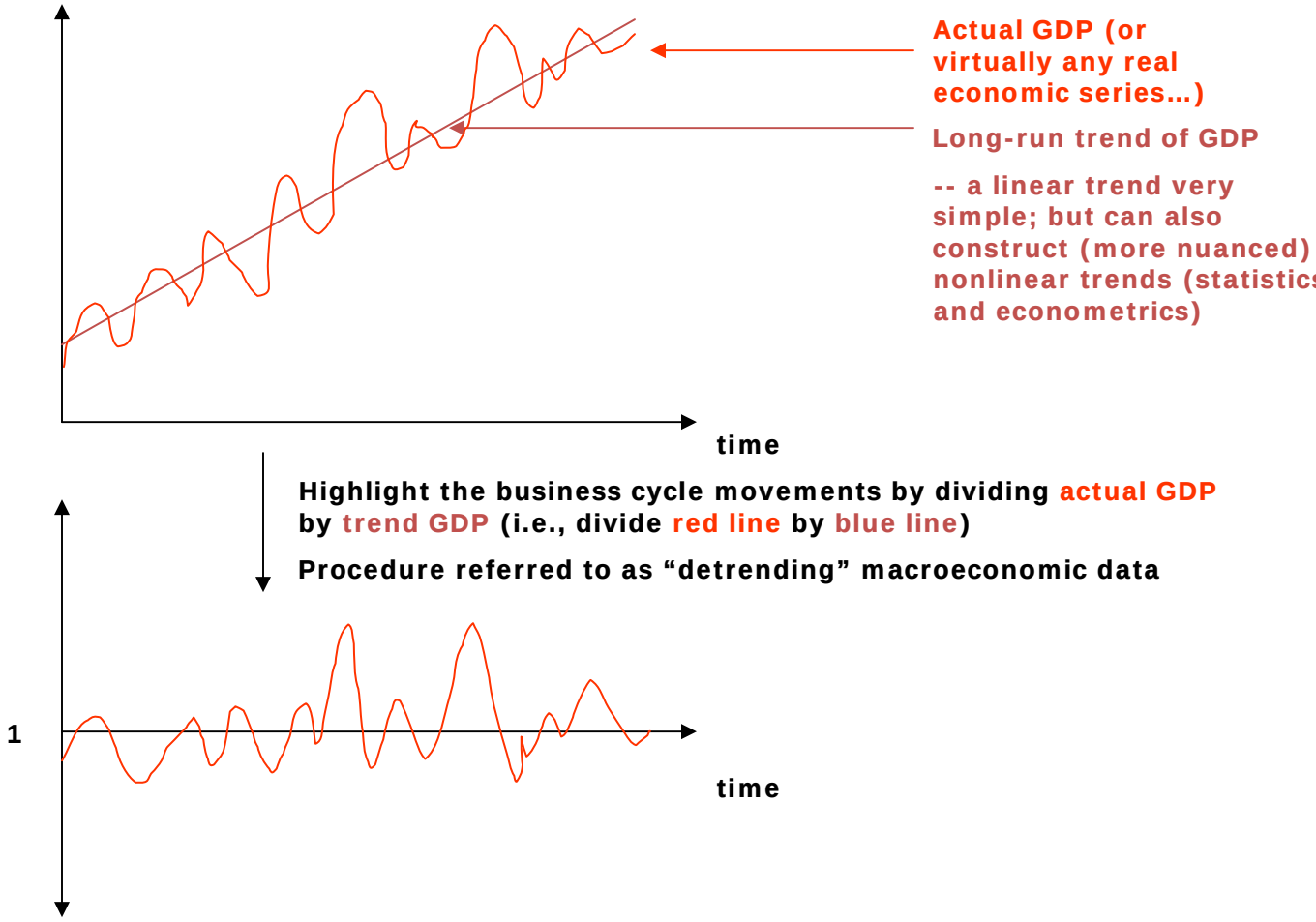

Figure 93. The bottom panel displays business cycle ups and downs of real GDP, which is the "detrended" version of the actual measured GDP displayed in the upper panel. The vertical axis of the bottom panel is percentage deviation from the long-run trend.

We've summarized "Phase 1" (which could be thought of as the "learning how to count" years of the macroeconomics profession) in just a few pages, but this was nearly two decades' worth of effort of many scholars, leaders, and policy-minded economists. Until "Phase 2," macroeconomics was largely qualitative (the **"social"** aspect of the growing profession), much more so than today. The mathematized portions (the **"scientific"** aspect of the growing profession) used fairly simple calculus routines, statistical

procedures, and diagrammatic analysis. But the mix of "social" and "science" in the social science of macroeconomics was to soon change.

Phase 2: Keynesian Macroeconometric Approach (Early 1950's – late-1970's)

The end of WWII is often attributed to the powerful engineering and technology the U.S. military rapidly developed. The idea of using advanced mathematics and advanced physics as a foundation for "practical" purposes (in this case, ending the war) captured the imagination of many (although surely not of everybody). This was also the period in which recently-developed mainframe computers using punch-cards to process computations were being increasingly put to research use.

These mathematically- and computationally-based ideas crept – or perhaps, better said, launched full force – into macroeconomic thinking. Not uncoincidentally, much of the high-powered technology that aided military efforts was developed at research universities at which top-notch economists were also housed, so these ideas were only a short skip away.

In the early 1950's, a heavy dose of mathematics and statistical analytics using high-powered mainframes quickly became the fashion of macroeconomics, both in policy circles and academic circles. A paramount goal for these emerging computable statistical descriptions of aggregate economic events – the **Keynesian macroeconometric** approach – was to answer important question hanging over macroeconomics: how can business cycles be "explained."

In terms of mathematics, the equations that were econometrically tested had the form of several equations that were hypothesized or "believable" descriptions of various interactions between economic variables; and these equations contained several economic price and quantity variables. Depending on the goal of the research, "several" equations and variables could mean just a few to several dozen to several hundred. In economics lingo, these are, respectively, **"small-scale economic models," "medium-scale economic models,"** and **"large-scale economic models."**

During the course of the 1950's, many Keynesian macroeconometric frameworks were developed around the world. One of, if not the, most prominent large-scale Keynesian macroeconometric frameworks that quickly took center stage was the **MIT/Penn/Federal Reserve Board** model constructed by a consortium of researchers and policy advisers at these three institutions.

Championing this effort was a group of three prominent economists from academia, all of whom would be future Nobel laureates – Paul Samuelson (Nobel recipient in 1970),

James Tobin (Nobel recipient in 1981), and Robert Solow (Nobel recipient in 1987). Samuelson, Tobin, and Solow were not cloistered academics in the Ivory Tower. Each spent significant time in his career serving in various government positions that advised President John F. Kennedy and President Lyndon B. Johnson, including serving on the White House Council of Economic Advisers.

The Keynesian-inspired macroeconometrics models took the form

$$x_{1t} = \alpha_0 x_{2t} + \alpha_1 x_{3t} + \alpha_2 x_{4t} + \ldots$$
$$x_{2t} = \alpha_3 x_{1t} + \alpha_4 x_{3t} + \alpha_5 x_{4t} + \ldots$$
$$\vdots$$
$$x_{136t} = \alpha_{597} x_{1t} + \alpha_{598} x_{13t} + \alpha_{599} x_{69t} + \ldots$$

in which all of the terms denoted $x_{\#t}$ represent **measured economic prices or quantities** in a particular time period t – for example, the CPI-based inflation rate in the fourth quarter of 1952. Coherently measuring macroeconomic outcomes was the significant achievement of "Phase 1." In "Phase 2," those interrelationships were being scientifically tested.

Each of the equations above represents a hypothesized relationship between some or many of the macroeconomic data. In any given equation, each of the **empirically estimated** α terms (the Greek letter "alpha") **describes the correlation observed in the real world between an economic variable on the right-hand side and the economic variable on the left-hand side.** For example, α_{598} was a description of how a one-unit increase in x_{13t} would affect x_{136t}, holding all else constant.[224] Any of the estimated α terms could turn out to be strictly positive, strictly negative, or statistically zero.[225]

This is the "science" component of Keynesian macroeconometrics. The "social" – or, in Keynes's own words, the "animal spirits" – component of the framework was essentially just the Keynesian idea that nominal wages and nominal prices may not adjust quickly enough **over the course of business cycles** to clear quantity supplied and quantity demanded. These concepts were embedded into the equations displayed above.

[224] *Ceteris paribus* (the Latin phrase for "all other things being held constant) analysis in economics, not just macroeconomics, is the usual way to empirically and theoretically understand connections between economic measures.
[225] Again, the econometric methodology is left for another course.

Given the wealth of economic data that was developed between the 1930's and 1950's, not just in the U.S. but also in other advanced nations, it was possible to estimate the α coefficients fairly tightly. The original intention of the Keynesian macroeconometric paradigm appeared to have been **positive** one. Not positive in the mathematical sense that the goal was to obtain α coefficients > 0. Rather, **positive economics** in the sense that the α's could help explain economic phenomena that have already occurred by focusing on the facts.

Some of the x variables in these macroeconometrics frameworks were policy variables over which either fiscal authorities or monetary authorities presumably had good control. For example, suppose that x_{3t} and x_{13t}, highlighted in red above, were the short-term nominal interest rate and the wage tax rate, respectively. What α_{598} then describes is the amount by which x_{136t} – suppose it's the quantity of aggregate investment, I – changes for a one-percent increase in the tax rate. In the U.S., Congress has fairly tight legislative control of, and enforcement of collections via the IRS, taxes.

As the macroeconometric approach became widespread, **positive economic** analysis could and did easily slip into **normative economic** analysis. To continue with the example, if politicians wanted to increase aggregate investment, economists could advise them how to achieve this. The advice is revealed in the estimated value of α_{598}. If the facts show that $\alpha_{598} = -0.5$, then to a obtain a **one percent increase** in x_{136t}, the labor tax rate should be **decreased by two percent,** *ceteris paribus.* Hence, the estimated value of α_{598} intended for **positive macroeconomic analysis based on past data** seemingly could be used to provide **normative policy advice to guide future macroeconomic outcomes.**

And that is indeed what happened in the U.S. and other advanced countries. Keynesian macroeconometric frameworks were increasingly being used for policy advice, which in turn was intended to improve the standards of living in the country. Referring back to Figure 90, the average U.S. GDP growth rate between 1950 and 1970 was 4.3% per year. In hindsight, economic growth was incredibly strong during the 1950's and 1960's, perhaps in part due to the "great policy tips" provided by the estimated models.

The developers of the Keynesian macroeconometric frameworks in some sense could self-congratulate themselves. Indeed, these were the halcyon days, the Golden Age, of the U.S. economy.[226] It came to the point where macroeconomic ups-and-downs started to be considered as a "solved problem," even though macroeconomics as a topic of collective thought had just emerged 30 years earlier. To portray the point in extreme, perhaps there was no longer any need for "judgment" in the conduct of fiscal policy or monetary policy. All that was needed was to conduct policy on autopilot, based on the mechanically-constructed α coefficients.

This seemed to be true throughout the 1950's and 1960's…..

[226] So much so that a TV show that began in the late 1980's, *The Wonder Years,* garnered rave reviews for its depiction of a family living in suburban USA in the late 1960's.

…but then turned out to no longer be true in the **stagflationary** period of the 1970's and early 1980's.

Looking again at Figure 90, GDP growth between 1970 and 1975 was 2.3% per year, down sharply from the 1950's and 1960's. Growth was stronger in the second half of the 1970's, averaging 4.7%. But then GDP growth declined precipitously between 1979 and 1983, averaging a paltry 0.5% per year.

In terms of price movements, as Figure 89 shows, inflation was quite tame during the 1950 – 1970 period, averaging about 2.2% per year. During the 1970's, however, inflation averaged 7.1% per year, meaning nominal prices of goods and services were rising about 3.5 faster per year in the 1970's than in the previous two decades. Inflation was even more extreme between 1979 and 1983, with an average annual rate of 10.4%.

Given the events of the 1970's and early 1980's, the term **stagflation** was coined to describe the high-inflation / slow-growth economy. But this characterization arose in hindsight. During most of the stagflationary period, policy makers continuously attempted to use Keynesian-based econometric advice to boost GDP growth and lower inflation.

But the fiscal policy levers of the airplane on autopilot turned out to no longer work.[227] All of a sudden, the glory decades of macroeconomics of the 1950's and 1960's seemed to have collapsed. If macroeconomics were to remain an organized field of thought, scores of economists figured that the future of macro **had** to somehow depart from Keynesian macroeconometrics because there was something seemingly **inconsistent with economic analysis** in these frameworks.

Many researchers struggled to describe the essence of this inconsistency. Finally, in 1978, it was the economist Robert Lucas (future Nobel recipient in 1995) who simply and elegantly described the root of the issue. His (later named) **Lucas Critique** stated:

Lucas Critique

The α coefficients in Keynesian macroeconometric frameworks **should be thought of as *depending on government policy directly*.**

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[227] Note the emphasis here on **fiscal** policy. In 1979, Paul Volcker was appointed Chairman of the Federal Reserve and adopted a never-before-seen strict **monetary** policy that is largely credited for the strong economic recovery starting in 1983. Volcker's policies were based on Milton Friedman's ideas that reigning in the growth of money supply will bring down the rate of inflation. More to come on this when we study monetary policy.

The Lucas Critique started ringing the death bell for Keynesian macroeconometrics. Why? Because this is **not** how Keynesian macroeconometric frameworks had been considered previous to the Lucas Critique. The α coefficients **multiplied** various and many economic measures, including policy instruments, either for positive purposes or normative purposes. But the α coefficients were essentially never seriously thought of as **themselves being dependent on policy.** Stated mathematically and returning to the earlier example, it was **not** the case that the macroeconometric models contained terms such as

$$\alpha_{598}(x_{3t})\, x_{3t},$$

in which α_{598} could potentially depend on the wage tax rate x_{3t}. Thus, if the tax rate x_{3t} changed, α_{598} **itself would change even though there is no data-based reason for this occur.** In principle, this was an econometric and statistical issue, which could be gotten around using higher-powered econometrics that would allow the α terms to depend on policy.

But a much larger, much deeper issue arose from the Lucas Critique, which is that Keynesian macroeconometric models **are not economic models, but rather only statistical descriptions of economic outcomes.** This then raises the natural question: what is macroeconomics, or, indeed, what is economics?

There are alternative ways of "defining" economics, but the theme that runs through them all is that **economics studies how individuals make informed choices given scarce resources.** After the Lucas critique, one could naturally ask: do the α terms capture these ideas?

The answer was a resounding "no." The macro profession was in disrepute by the late 1970's, on the verge of extinction.

Phase 3: Modern Macroeconomic Frameworks (late 1970's – present)

Macroeconomics survived.

There were once again many researchers who postulated many new ideas to consider economy-wide events. The one that stuck, though, and has been the predominate strain of thought for now three decades is what we will call **modern macroeconomics.**

Modern macroeconomics begins by explicitly studying the **microeconomic** principles of utility maximization, profit maximization, and market clearing. Once all of that is done – and we are going to spend a lot of effort going through all of this – then one can

consider what the consequences of various fiscal policies or monetary policies on **consumers' and firms' informed choices,** which then leads to different market-clearing outcomes.

This modern macroeconomic approach quickly captured the attention of the profession through the 1980's for two reasons. First, it actually begins with microeconomic principles, which was a rather attractive idea. Rather than building a framework of economy-wide events **from the top down** (which macroeconometric models increasingly came to be viewed as), one could build this framework using microeconomic discipline **from the bottom up.** Figure 94 conveys this idea.

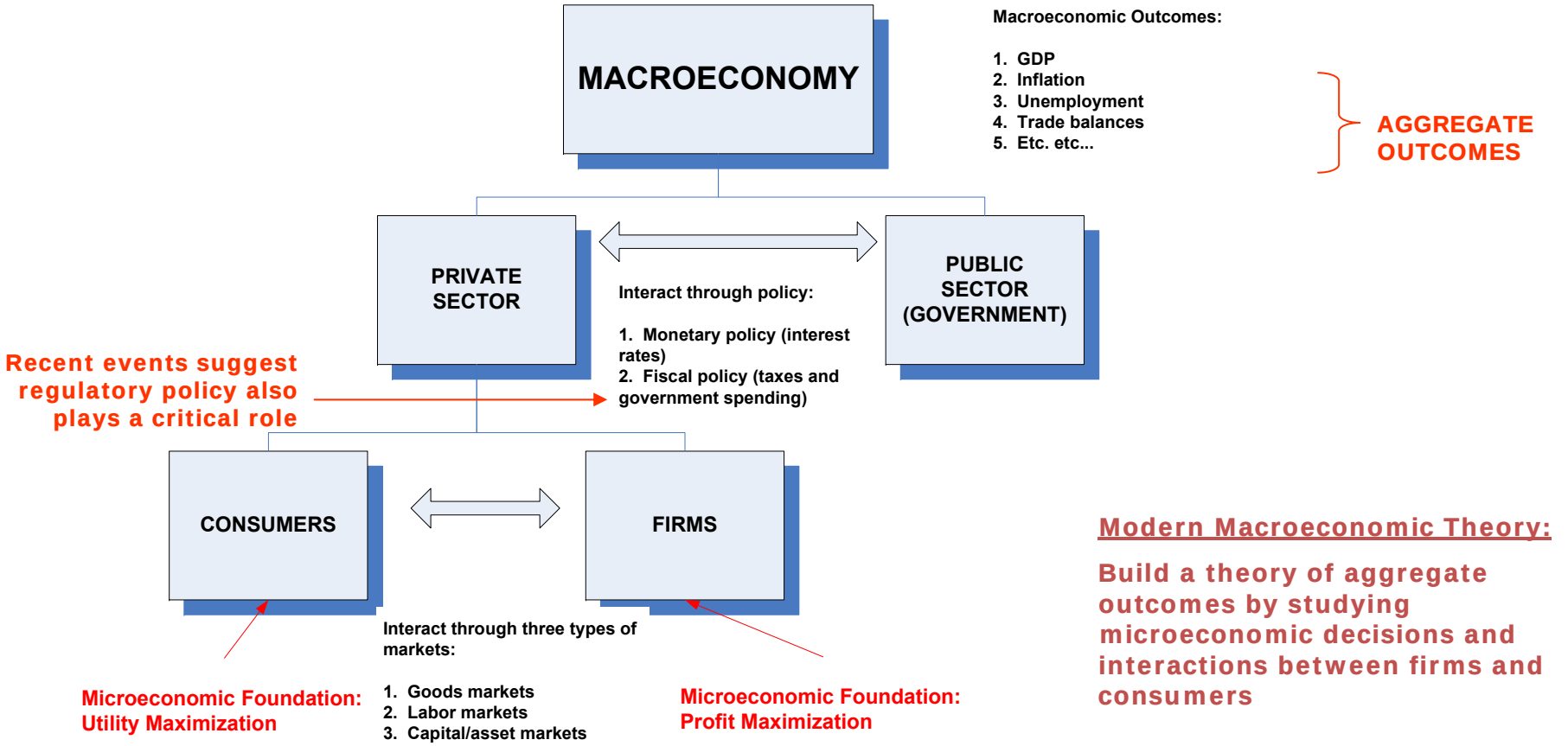

Figure 94. Schematic of the overall economy.

Second, it was in the early 1980's that **desktop computing** began. The new breed of modern macroeconomic frameworks could thus be computed directly in one's office, rather than needing to reserve time for use of costly mainframe machines. (Note the parallel between the start of Phase 2 and the start of Phase 3: in the latter, brand-new mainframe computational power was available; in the former, brand-new desktop computation power was available.[228])

The three distinct types of markets that modern macro was, and continues to be, based on are goods markets, labor markets, and capital markets, as Figure 94 portrays.

The ensuing chapters tell the tale of **modern macroeconomic analysis** that are hinted at in Figure 94. However, to tell this tale, we first have to discuss some **growth theory.** which we had earlier asserted was a branch of economics **different from macroeconomics**. As we will see, growth economics turns out to be the major starting point of modern macroeconomics. And in some sense, it is the aforementioned Robert Solow that connects the two.

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[228] Should we chalk that up to innovations in technology? The consensus answer is "yes," and we get a short glimpse of this idea in the Growth chapter.