The Development of Macroeconomics and the Revolution in Finance

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Every graduate student learns a story about where modern macroeconomics came from, if only as context for the reading list he is supposed to master as part of his PhD coursework. Usually the story is about disciplinary progress, the slow building of the modern edifice one paper at a time by dedicated scientists not much older than the student himself. It is a story about the internal development of the field, a story intended to help the student make sense of the current disciplinary landscape and to prepare him for a life of writing and receiving referee reports. Exemplary stories of this type include Blanchard (2000) and Woodford (1999).

So, for example, a typical story of the development of macroeconomics revolves around a series of academic papers: in the 1960s Muth, Phelps, and Friedman planted the seed from which Robert Lucas and others developed new classical macroeconomics in the 1970s, from which Ed Prescott and others developed real business cycle theory in the 1980s, from which Michael Woodford and others in the 1990s produced the modern new neoclassical synthesis.[1] As a pedagogical device, this kind of story has its use, but as history of ideas it leaves a lot to be desired.

In fact, as I shall argue, neoKeynesian macroeconomics circa 1965 was destabilized not by the various internal theoretical problems that standard pedagogy emphasizes, but rather by fundamental changes in the institutional structure of the world

[1] Muth (1961), Phelps (1968), Friedman (1968); Lucas (1975, 1976, 1977); Kydland and Prescott (1982), Long and Plosser (1983); Woodford (2003).

that neoKeynesian macroeconomics had been developed to explain. We see this fundamental institutional change most clearly when we focus our attention on the financial sector, where the shift toward more flexible markets began, and we see its intellectual consequences most clearly when we focus our attention on the financial theory that arose to explain how these new more flexible markets work. The development of macroeconomics followed afterward, with about a decade lag. The development of macroeconomics since 1965 has thus been fundamentally intertwined with the development of finance in the same period. By contrast to the familiar pedagogical account, I suggest that the history of macroeconomics is about institutional and intellectual change that made its way into macroeconomics from the outside.[2]

One obstacle in the way of this new history is another story that every graduate student learns, this one a story about where modern finance came from. Here as well the standard story is about disciplinary progress, specifically about how standard economic science transformed a field that had been dominated by craft practice into a proper scientific discipline; Bernstein (1992) can be taken as an exemplary account. Once again, the story revolves around a series of academic papers. Key theoretical milestones were the Modigliani-Miller theorem about corporate finance, the portfolio theory of Harry Markowitz, and the capital asset pricing model of William Sharpe and John Lintner.[3] Here again, notwithstanding its pedagogical value, this kind of story leaves out a lot that we need for a proper history of ideas. Most important, all of these theoretical

[2] In what follows I drastically simplify what is a much richer and more complicated history. See Mehrling (2005) for a much fuller account.

[3] Modigliani and Miller (1958), Markowitz (1959), Sharpe (1964), Lintner (1965). As an indication of how drastically I am simplifying the account, observe that I neglect here the key empirical milestones of Eugene Fama and others, as well as the development of options theory by Fischer Black, Myron Scholes and Robert Merton.

developments must be understood as an attempt to respond to a key institutional change, namely the recovery of private capital markets after the war.

Depression and then World War II had left behind a highly regulated financial and banking system, built on a base of presumably safe public debt. For the first decade or so after the war, most large corporations were self-financing, first out of accumulated war time surpluses and then out of retained earnings. Only small firms and new firms relied on external sources of finance. As time went by however, the need for external funds spread to larger firms, and the question therefore arose whether it was better to borrow or to issue additional equity shares. Modigliani-Miller (1958) can be understood as an early intellectual response to this question, indeed a bold statement about the irrelevance of capital structure that helped to break down generational resistance to external finance. Meanwhile, at the same time as corporations were beginning to tap capital markets, insurance companies and pension funds were rising in importance as a source of funds, and bringing a new demand for tools to understand the question of portfolio allocation. The work of Markowitz (1959) can be understood as an early intellectual response to this question.

Following along these same lines, Lintner's CAPM can be understood as having emerged from practical problems in corporate finance, since Lintner was trying to show that the results of Modigliani and Miller would not survive extension to a world of risk. And Sharpe's CAPM can be understood as emerging from practical problems in investments, since Sharpe was trying to extend the Markowitz portfolio choice framework in order to make it more practically usable. In both cases, although the work could quite correctly be characterized as the application of economic thinking to a

problem in finance, it was institutional change in the outside world that put the problem on the intellectual agenda in the first place. Modern financial theory grew up to provide answers to pressing practical problems posed by the recovery of private capital markets.

In the event, the recovery of private capital markets had implications for the wider economy as well, but it took a while for those implications to play themselves out. In the macroeconomics of 1965, when CAPM came onto the scene, thinking was still very much influenced by the failure of pre-Keynesian orthodoxy to provide an adequate intellectual framework for treating the problems of depression and total war. The rise of Keynesian ideas to hegemony had taken place in the highly regimented and regulated post war world, and neoKeynesian macroeconomics was specifically devised to explain how that world worked. In historical context, the standard Keynesian assumption of sticky prices and wages should be understood not as an ad hoc assumption lacking satisfactory theoretical justification, but rather as an attempt to capture important institutional facts about the real world economy, namely industrial oligopoly and labor unions. Similarly, the initial Keynesian emphasis on fiscal policy should be understood as an attempt to focus attention on the policy levers that were actually available at a time when monetary policy was still subordinated to the exigencies of war finance.

As soon as the Fed-Treasury Accord made independent monetary policy possible, Keynesians set their sights on developing the monetary side of the standard model, and they naturally conceived this project as capturing the institutional specificity of the monetary sector. Just so, the monetary sector of the FMP econometric model of the U.S. economy, a project overseen by Franco Modigliani at MIT, was a model in which the Fed's control stems from its monopoly supply of bank reserves, which the regulated

banking system was required by law to hold in proportion to its deposits. Control of bank reserves was supposed to give the Fed more or less absolute control over short term interest rates, and short term rates were supposed to influence long term rates by their effect on bond issuers and holders who have their own preferred maturity or "habitat."[4] In 1965, the key bond issuer was still the U.S. government, but the recovery of private capital markets was starting to change that.

Read against this background, the Sharpe and Lintner versions of CAPM can both be seen as exquisite straddles between the old world of riskfree government securities with administered prices, and the new world of risky private securities with market prices. Both Sharpe and Lintner take the riskfree rate of interest as an exogenously determined variable, and both focus their attention on the price of risk as endogenously determined by market forces. In effect, both offer partial equilibrium models of the determination of the price of risky assets alone, while leaving the riskfree rate as an exogenous policy variable. Thus did CAPM come onto the economists' radar screen as an add-on to the standard IS-LM story in which government policy determines the rate of interest.[5] Whether consciously or not, the economists Sharpe and Lintner both produced versions of CAPM consistent with the macroeconomics they knew.

But there was another version of CAPM also, this one produced by Jack Treynor (1962). Neither professor nor economist, Treynor had independently produced his own version of CAPM in an attempt to extend Modigliani-Miller to a world of risk, but he never published it. He did however show it to Fischer Black, his fellow analyst in the Operations Research section of the management consulting firm Arthur D. Little.

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[4] Modigliani, Rasche and Cooper (1970).

[5] Tobin (1958) can be seen as showing the way to such an add-on interpretation of Markowitz-style portfolio theory even before CAPM.

Crucially, Black interpreted Treynor's CAPM as a theory not just of the price of risk, but also of the riskfree rate. If markets determine the one price, then surely they determine the other price as well.

For the non-economists Treynor and Black, the fact that their general equilibrium CAPM conflicted with standard macroeconomics was just so much the worse for standard macroeconomics. Here at the very origins of modern finance was planted the seed that would grow up to challenge neoKeynesian orthodoxy in macroeconomics.

What is CAPM?

Economics: Fed Policy Security Markets

$$\underset{\uparrow}{ER_i} = \underset{\uparrow}{R_F} + \underset{\uparrow}{(ER_M - R_F)\,\beta_i}$$

Finance: Riskfree Rate Price of Risk

Indeed, Black's very first published paper "Banking and Interest Rates in a World without Money: The Effects of Uncontrolled Banking" (1970) self-consciously threw down the gauntlet for what became a lifelong project of reconstructing macroeconomics along general equilibrium lines (Black 1987, 1995a). The neoKeynesian macroeconomics of Modigliani and others was, for Black, the macroeconomics of the old world of rigidities and regulation. He was interested in constructing the macroeconomics of the new world of flexible markets that he could see emerging in the future. He reasoned that profit seeking behavior would eventually overcome the rigidities and

regulation of the old, so the tide of history was on his side. Even more, by developing a theory for the world to come he was on the side of history, since such a theory could be used to identify exactly where the rigidities were creating profit opportunities.

The ideal world that CAPM outlines is a world with only two financial instruments, risky equity and riskless debt. Households hold a diversified market portfolio of the equity issued by firms, and then borrow and lend among themselves in order to achieve their desired risk exposure. In this ideal world there is a natural role for index mutual funds that issue shares in a diversified market portfolio of equity. And there is a natural role for uncontrolled banks that facilitate riskless borrowing and lending. At the time CAPM was invented, neither of these apparently natural institutions existed, but the theory said there should be room for them. Black drew the conclusion that a natural way to test the theory would be to promote the institutional change it predicted, and to see if in fact there was room for that institutional change in the real world (Black 1972a, 1975).

Index mutual funds and bank deregulation were just the start. Reconstruction of the financial sector along lines suggested by CAPM was, in Black's mind, just a first step toward broader reconstruction of the larger economy along similar lines. His precocious theory of business cycles (Black 1972b) can be understood as an attempt to begin thinking about how such a reconstructed economy would work. Business fluctuations in such a world, he reasoned, would be nothing more than the real side analogue of the ups and downs of the stock market with which we are all familiar. In the stock market, CAPM tells us that risk is merely the cost of reward. In the economy more generally, CAPM tells us that business fluctuation is merely the cost of dynamic growth.

In Black's early work we see much that would later enter macroeconomics in the work of Lucas, Prescott, and others, (although there are also important differences). But intellectual priority is not the important point. Lucas and Prescott were the ones who made the revolution in macroeconomics, not Fischer Black, and they rightly have received the credit. Rather, what the career of Black shows is how the external conditions were primed for such an intellectual revolution, and also how the internal intellectual traditions of economics were primed to resist it. Economics circa 1965 could make its peace with the CAPM of Sharpe and Lintner, but not with the CAPM of Treynor and Black. But if Black could imagine it but without having enough of an economics background to make it stick, then it was only a matter of time before someone else with more standing in the profession, and greater sensitivity to the mores of the field, took up similar themes. That person, if we have to choose one person, was Robert E. Lucas.

	Lucas (Economics)	Black (Finance)
Empirical Style	Calibration	Observables
Theoretical Style	Tractable Models	Special Examples
Stocks v. Flows	Y= Af(K,L)	Y = rK
Money	Quantity Theory	World without Money
Uncertainty	Extrinsic	Intrinsic
Mathematics	Dynamics (time)	Uncertainty (risk)
Market Equilibrium	Planning problem decentralized	CAPM

A proper history of how exactly the revolution in macroeconomics happened has yet to be written. My only suggestion is that such a history should begin from finance. The standard pedagogical story of where macroeconomics came from is not wrong, but it is Hamlet without the prince. The prince is finance. Macroeconomics developed as a response to institutional and intellectual changes that were taking place outside the confines of the discipline, and that development continues even today.

The macroeconomics of 1965 had a characteristic approach to the problem of what John Maynard Keynes famously called the "dark forces of time and ignorance." Keynes himself emphasized the inadequacy of human reason for grappling with the problem, and placed his confidence instead in various "semi-autonomous bodies within the State." Keynes' answer to radical uncertainty was mechanisms of social control that he hoped could pick a path through the chaos, preserving the upside of expanded individual freedom while protecting against the downside of economic and social barbarism. Even after all the changes since Keynes, modern macroeconomics offers much the same answer, albeit with a more single-minded focus on the central bank as the most significant semi-autonomous body for this purpose.

Modern finance has a contrasting answer to the same problem, namely mechanisms of risk control that make use of highly developed financial markets. As in Keynes, individual human reason is recognized to be no match for the dark forces of time and ignorance, and the answer is to rely instead on collective reason. The difference is that the efficient market, rather than the state, is seen as the best agent of that collective reason.

This difference is of course everything. Fischer Black, in one of his last articles put the difference starkly. Says Black: "I don't see that the private market, in creating this wonderful array of derivatives, is creating any systemic risk. However, there is somebody around creating systemic risk: the government…Perhaps the biggest systemic risks that the government creates come from its debt guarantees" (Black 1995b, 7-8). For a macroeconomist, this is a shocking statement. These very same debt guarantees, explicit and implicit, are for a macroeconomist essential safeguards against the downside risk of an uncertain future.

Thus, what macroeconomics sees as an essential part of the solution, modern finance sees as an essential part of the problem. And what macroeconomics sees as an essential part of the problem, namely the unfettered workings of speculative markets, modern finance sees as an essential part of the solution. This is the reason why, notwithstanding a fundamentally similar worldview about the nature of the problem we face, namely radical uncertainty about the future, the revolution in finance grew up in opposition to the Keynesian revolution in macroeconomics.

That opposition continues today, notwithstanding all the changes that have taken place in macroeconomics, and notwithstanding periodic calls for greater communication between finance and economics (Summers 1985). That opposition has played a key role in driving the development of macroeconomics up to the present day, and the same opposition can be expected to play a similarly key role on into the foreseeable future. The contrast of Fischer Black and Robert Lucas suggests the faultlines along which macroeconomics will continue to develop in the future.

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