# 22. Touching the Elephant: Three Views

Back in Lecture 1, The Four Prices of Money, I drew two pictures on the board, IS-LM to represent Intermediate Macro and the Fisher diagram to represent Intermediate Micro, both prerequisites for this course but neither of which I said would be of much help. These pictures capture what I call the "economics view", and I wanted to put them aside for a while in order to explore what I like to call the "money view" of the world. Today I want to introduce yet a third view, the "finance view", and in doing so begin to consider the connection between all these three views. The argument I will present is largely historical, as in history of economic thought, but the point is to help us understand the current intellectual landscape, and in particular to situate the present course in the broader intellectual discourse of both economics and finance.

Three World Views

For the last two months we have been living in the money view world, a world where almost everything that is important happens in the temporal present. We have been talking about a world in which cash inflows must be adequate to meet cash outflows (the survival or liquidity constraint) over the period of a single day. This is a period much too short for there to be any elasticity in production or consumption, the usual subject matter of economics, so we have abstracted from them. In the money view, we are looking at a world where "the present determines the present".
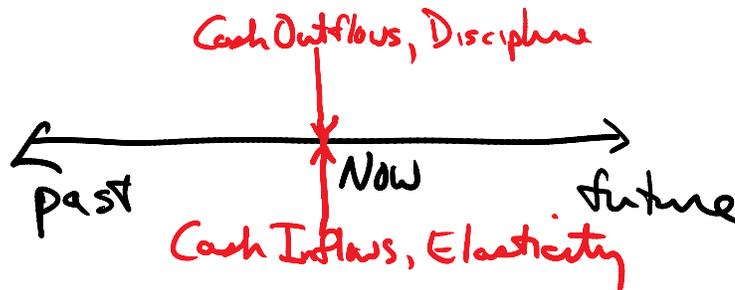
In the **economics view**, by contrast, we are typically looking at a world where "the past determines the present" in the sense that the current flow of goods being produced is the consequence of capital investments made over many generations in the past. The sale of those goods is the source of current income, most of which is consumed but some of which is saved in the form of additions to the capital stock available for future production.

$$Y=F(K,L) \text{ Production}$$
$$K_t = K_{t-1} + I_t \quad \text{Capital Accumulation}$$

Most of the debate in economics, during the last twenty years, has been not about the contrast between the economics view and money view, but rather about the contrast between the economics view and the **finance view**, which is diametrically opposite. In

finance, "the future determines the present" in the sense that current capital values are a consequence of ideas about future income flows, which we discount back to the present. Changing ideas cannot change the physical quantity of capital currently in existence, but they can very easily change the valuation of that capital, as well as the valuation of capital investments not yet made. Mere ideas thus change the current world by drawing a path that links it with some possible future world.

Economics View	Money View	Finance View
Past determines present	Present determines present	Future determines present
Capital stock, K	Cash Flow	Capital valuation, p_k
$Y=f(K,L)$	Survival Constraint	$P_K = E_0\Sigma(1/1+r)^t C_t$

The economics view and the finance view meet each other in the present, but the present is the realm of the **money view**. Cash flows emerging from past production meet cash commitments engaged with an eye on future production, and the balance or imbalance between the two poses the problem that is solved every day by the monetary apparatus.

Most of the history of monetary thought is about the conversation between the money view, which emerges organically from experience with the monetary system, and the economics view in the academy. But the last few decades have been an exception. Some thirty years ago, when I was starting out in monetary economics, the most significant intellectual challenge to monetary economics came from finance.

Actually finance challenged economics mainly, and the big story of the last thirty years has been economics vs. finance, now more or less resolved (albeit with remaining unease on both sides) with the acceptance of finance as a proper subfield of economics. My own interest has been the challenge of finance to the money view, and my career has been all about building up the money view is a response to that early challenge.

To get a flavor of that challenge, listen to Fischer Black in his 1976 manifesto "What a Non-monetarist Thinks":

> I believe that in a country like the US, with a smoothly working financial system, the government does not, cannot, and should not control the money stock in any significant way. The government does, can only, and should simply respond passively to shifts in the private sector's demand for money. Monetary policy is passive, can only be passive, and should be passive. The pronouncements and actions of the Federal Reserve Board on monetary policy are a charade. The Board's monetary actions have almost no effect on output, employment, or inflation.

Strong words, so strong that we might be inclined to dismiss them out of hand as the ravings of the uninformed. Today I propose to resist that natural inclination, and instead try to understand the conception of the world in which such words might make sense.

Imagine A World Without Money: Commodity Exchange

Let's start with economics, which we all know, and the world of traditional value theory. When economists build theories about why goods have the prices they do, we quite typically abstract from money. This practice has allowed us to build the elegant modern Walrasian general equilibrium theory of value. It is however a theory without any place in it for money.

Just so, consider the familiar static two-good equilibrium. Here we have production possibilities and consumer preferences jointly determining the relative price of two goods. If the price of oranges is p_o and the price of apples p_a then the slope of the budget line is $-p_o/p_a$, the relative price of the two goods.
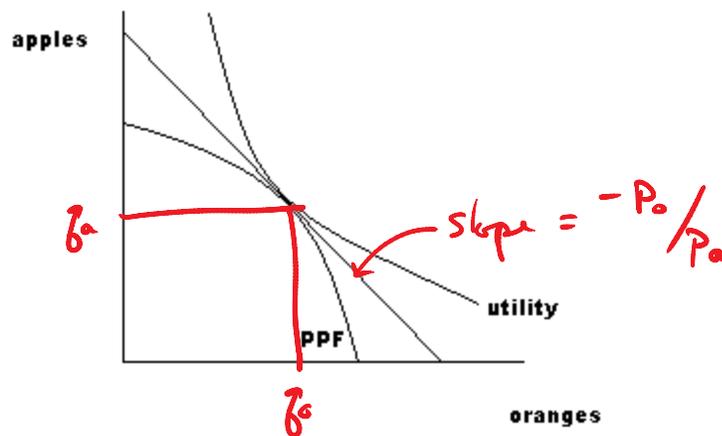
Nothing is said about money. Indeed nothing is said about the price level either.
Into this silence on the matter of money and prices enters the quantity equation, which we can write as

$$MV = PQ, \text{ or } MV = p_a q_a + p_o q_o$$

The right hand side tells the value of goods sold, and the left hand side tells how money turnover facilitated that sale. The equation as stated is an identity really, but economists have always been tempted to read causality into it. One story is that the quantity of money determines the price level—this is reading the equation left to right, which gives us the quantity theory of the price level. Another story is that the scale of transactions determines the scale of money flow (including elastic credit substitutes)—this is reading the equation right to left. We leave this debate aside, and pursue other matters for the moment.[1]

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[1] Most economists, following Frank Hahn (e.g. Money and Inflation 1982), see the absence of money as a weakness of the general equilibrium theory. The theory doesn't have anything to say about the monetary phenomena and institutions that are apparently so important in the real world. The response of economists has been to try to

In the 20th century, the great Irving Fisher moved debate in a more constructive direction by expanding the idea of exchange to include intertemporal exchange. Consider thus the familiar one-good two-period equilibrium. Here we also have production possibilities and consumer preferences jointly determining the relative price of two goods. What is new here is the conception of the rate of interest as the relative price of goods between two different time periods. That rate of interest, notice, has nothing to do with money. Denoting production by $\{C_1, C_2\}$, the wealth of the representative consumer can be written

$$W = p_1 C_1 + [p_2/(1+r)]C_2.$$

In equilibrium, the price ratio $p_1/[p_2/(1+r)]$ will be equal to the marginal rate of substitution for each consumer, and also the marginal rate of transformation for each producer.
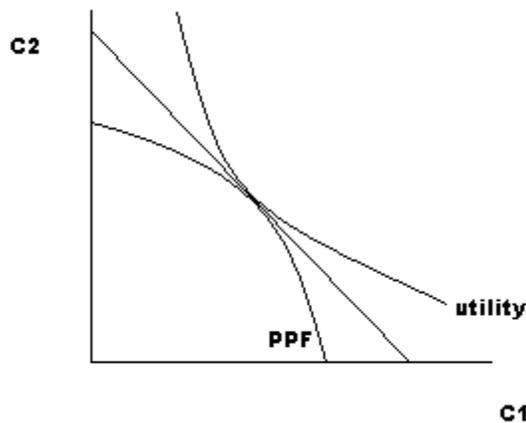
develop models in which markets are less perfect, so there is a place for money. Three approaches can be distinguished:

1) Overlapping generations, money as a store of value
   (Wallace "The Overlapping Generations Model of Fiat Money"1980)
2) Search and matching models
   (Kiyotaki and Wright "On Money as a Medium of Exchange" 1989)
3) Walrasian GE with transactions costs
   (Starr "Monetary General Equilibrium with Transactions Costs" 2005)

All of these take as their problem the exchange of commodities in a world without any financial assets except money (i.e. an extension of our first model), and they show that money plays a role. The problem is that, quite generally, these results do not generalize to a world with financial assets because money, paying no interest, is a dominated asset.

Again nothing is said about money or the price level, and we are tempted to try to insert some version of the quantity equation into the vacuum. But we have a problem. Future consumption is not really exchanged today, so we can't really put it on the right hand side along with present consumption. Fisher's brilliant innovation was to realize that the **market for securities is a current market with current prices where claims for future consumption are exchanged**. How so?

To make room for loans (credit) we assume that there are two kinds of people in this world, both with the same production possibilities, but one that prefers consumption today and one that prefers consumption tomorrow. In equilibrium, both kinds of people produce the current and future consumption goods in the same proportions, but the present-oriented consume more of the present good and the future-oriented consume more of the future good.

As before, the relative price of goods today and goods tomorrow includes the rate of interest, which looks like the pure price of time. However, instead of thinking of the two consumers as trading goods across time, we think about what happens in period 1 separate from what happens in period 2. In period 1, the present-oriented consumer A consumes more of the present good than he produces, and in period 2 the future-oriented consumer B consumes more of the future good than he produces. How is this achieved? By borrowing and lending at the rate of interest. We might imagine this being facilitated by some financial intermediary. The quantity of outstanding credit then depends on the difference between people. Maybe people use these credit balances to make payments, but there is nothing about that use that affects prices.
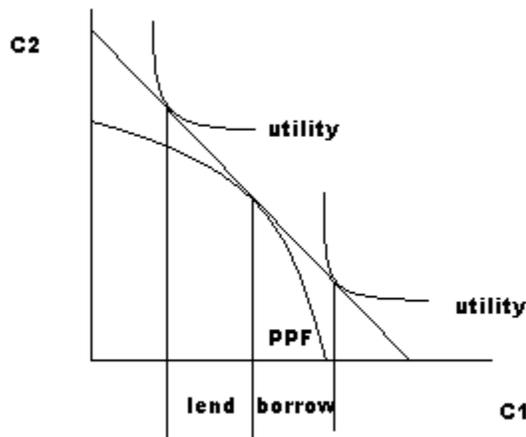

So now we know how to expand the quantity theory to an intertemporal equilibrium, but we still have a problem, no money.

One way to proceed would be simply to add securities transactions and the prices at which they are made to the commodity transactions and the prices at which they are made. Irving Fisher's transactions version of the quantity theory did just that:

$$MV = PT = p_cC + (1/1+r)F$$

where F is financial transactions.

Again there is temptation to read this identity as a causal equation, and there is dispute about whether causation flows from left to right or right to left. For our purposes the important point is that the left to right view suggests that monetary manipulation by the central bank affects not only the price level (price of goods) but also the price of assets, P_K, and hence also the rate of interest r. This is the origin of the idea expressed in the Hicks-Samuelson IS-LM model that the monetary authority can affect the real economy by pushing around the money supply
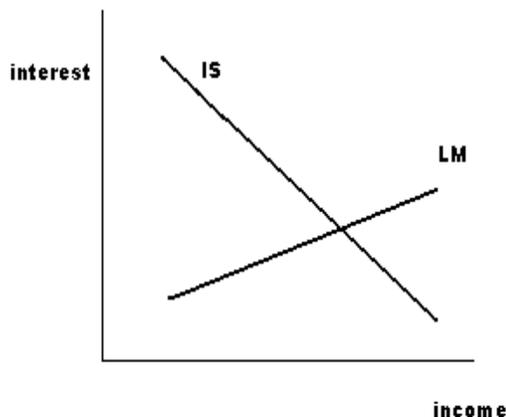
It is this story about money that Fischer Black was attacking so emphatically back in 1976. What did he think was wrong with it?

Imagine a World without Money: Risk

Fischer Black always started from the world of securities, not commodities, and from the Capital Asset Pricing Model. Here we have the "finance view" in its purest form. (We can think of Irving Fisher as a transitional figure between the economics view and the finance view.) We can think of CAPM by comparison to the Fisher model as involving the introduction of **risk**. In standard general equilibrium theory, we do this by distinguishing future states of the world and treating goods produced in each possible future state as different goods with different prices.[2] From a financial point of view, the important point is that the relative price of goods today and goods tomorrow includes not just the price of time but also the price of risk. The great achievement of the Capital

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[2] Arrow and Debreu,

Asset Pricing Model was to allow us to separate out these two prices and talk about them separately.[3]

Imagine a world of capital assets, each of which we characterize by the mean and variance of its return over a short interval of time, and consider the set of expected returns and variances that can be achieved by holding a portfolio of these assets. To make the equilibrium interesting, we assume that there are two kinds of people in this world, one quite risk tolerant and the other not so risk tolerant. In equilibrium, everyone holds the same portfolio of the risky capital assets, but the risk tolerant hold more and the less tolerant hold less. This allocation is achieved by having the more tolerant borrow from the less tolerant, at the riskfree rate of interest. The interaction of these two types determines jointly our two prices, the risk free rate R_f, and the price of risk $ER_m - R_f$, which is the expected return on the market portfolio minus the riskfree rate. In equilibrium we get the famous CAPM equation

$$ER_i = R_f + (ER_m - R_f)\beta_i \quad \text{Security Market Line}$$

$$ER_p = R_f + (ER_m - R_f)\sigma_p/\sigma_M \quad \text{Capital Market Line}$$
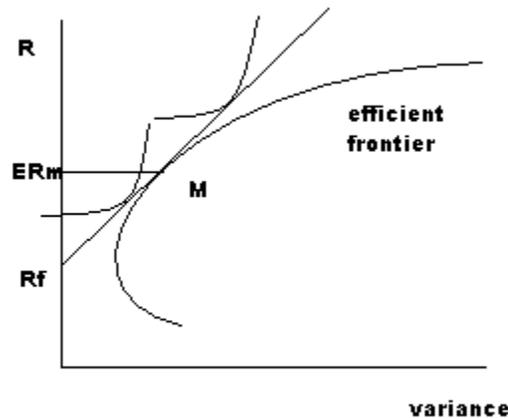
Starting from CAPM, Fischer Black proposes that we think of banks first of all as essentially intermediaries between the risk tolerant and the less risk tolerant. As a first approximation, bank assets are the loans to the risk tolerant, and bank liabilities are the assets of the less tolerant. Thus, if each has wealth of 100, the tolerant borrow 50 in order to invest 150 in the risky portfolio, and the less tolerant lend 50 in order to invest 50 in the risky portfolio. The important point is that **the outstanding quantity of bank assets and liabilities is determined by private supply and demand, and the same is true of the interest rate**. In a CAPM world, monetary policy determines neither the quantity of money nor the price of money. Both are endogenous variables determined by private borrowing and lending behavior.

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[3] Rubinstein has a nice paper sorting out the relationship between Arrow Debreu and CAPM.

If we think about this through the lens of the quantity equation, the point is that financial equilibrium requires us to think of the causation passing from right (PT) to left (MV). Think about what happens if the price of the market rises. Risk tolerant wants to borrow to buy more, risk averse wants to sell to lend more, so both loans and deposits change whenever the stock market changes.

Risk Tolerant		Bank		Risk Averse	
Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
150 Market	50 Loan	50 loan	50 deposit	50 Market 50 Deposit	

That is the sense in which Fed monetary announcement is a charade, as Fischer Black asserts. From his point of view, the quantity of money (bank deposits) <u>must</u> be allowed to fluctuate freely to allow people to adjust their risk exposure as stock prices fluctuate. Similarly, the price of money (rate of interest) <u>must</u> be allowed to fluctuate freely to allow the market for riskless borrowing and lending to clear. In both respects there is no place for money or monetary policy.

In this world there is no role for government policy to control the money supply. (Black likes to say that there is nothing that we can call the quantity of money, and hence nothing to control.) It is equally true that there is no role for government policy to control the rate of interest. Of course the government has, historically, tried to control both of these things (p. 13-17). Black's position seems to be that such efforts produce inefficiency at the very least. In a financially developed economy, they don't even do that, since there will be multiple ways to evade control. This is the intuition behind the audacious quotation with which we started the lecture.[4]

The Education of Fischer Black

What Black observes is that, in this CAPM world, once people are using banks as their source of riskfree borrowing and lending for investment purposes, it is inevitable that they would use them as means of payment as well (p. 12). People who need to make payments to one another do so simply by making book entries in the banking system. What is more, payments from a negative account (loan) seem just as possible as payments from a positive account (deposit). Such patterns of payments will affect the quantity of bank assets and liabilities, but not their price because the payments system is so efficient.

Just so, if a holder of a positive account in one bank makes a payment to a holder of a positive account in another bank, the quantity of outstanding bank credit does not

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[4] The economics profession has attempted to respond to the challenge of finance. To date the most successful account is Mike Woodford's <u>Interest and Prices</u>, which synthesizes the current consensus around some kind of Taylor Rule oriented toward inflation targeting. The focus however is entirely on inflation of goods prices, and not at all on asset prices. What remains to be done for the modern model is what Irving Fisher did for the 19th century model, i.e. expand it to asset prices by linking to finance. That's the step I am trying to point toward in this course.

change. But if a holder of a negative account makes a payment to a holder of a positive account, credit expands. And if a holder of a positive account makes a payment to a holder of a negative account, credit contracts. (Work this out for yourself, or see previous lecture on payments system.)

This is the elasticity that we noted in an earlier lecture as being essential for smooth operation of the payments system. Note that in the finance view of the world, **the elasticity of the payments system arises from the elasticity of credit in capital markets, not vice versa as in the money view.** Private borrowers and lenders must be allowed free rein in order to achieve an equilibrium of supply and demand in their attempts to achieve desired exposure to market risk. Fischer starts at the bottom of the money credit hierarchy, whereas we started at the top, but we both arrive at a similar idea about the intertwining of the payments system with the credit system.

The big difference is that for Fischer, the only constraint is wealth, which people allocate between different assets depending on their tolerance for risk, in a market where price is efficient and there is no trouble adjusting portfolios at the margin. There is nothing here about the money view's emphasis on the survival constraint, or the role of dealers in marking markets. But wait….

Fischer started with CAPM, but he didn't stop there. On Monday, December 30, 1985, Fischer gave the presidential address to the American Finance Association which was meeting in New York, and stunned his audience with the following words:

"We might define an efficient market as one in which price is within a factor of 2 of value; i.e. the price is more than half of value and less than twice value. By this definition, I think almost all markets are efficient almost all of the time. 'Almost all' means at least 90 percent."

Here we can detect, I think, the influence of Fischer Black's friend, Jack Treynor, who had originally introduced him to his own version of the capital asset pricing model but gone on to a life in the markets rather than academia, and in that life had produced the dealer model that we have been using in previous lectures. Think about what the dealer model says. It says, just as Fischer relates, that the price of a security fluctuates within bounds set by the value based trader, bounds that can be rather far from true value. At any moment in time, the price of the security will lie somewhere within those bounds, exactly where depends on the inventory of the dealer. This is the model in Fischer's mind when he spoke those words in 1985.

Once we bring on board the dealer model, we have the beginnings of a bridge between the finance view and the money view. It is not clear to me that Fischer walked very far along that bridge in the time before he died, but he certainly got started. Were he alive today, here is what I would urge on him as the crucial next steps.

Lesson 1: <u>Market</u> liquidity depends on the dealer system.

This is a crucial step away from the pure CAPM, and a step that reveals an important limitation of that model, namely its abstraction from liquidity. The model essentially

assumes that all securities can be bought and sold in perfectly liquid markets, but this would be true only if the outside spread, established by the value trader, was as tight as the inside spread, established by the dealer. This realization represents a first step in bringing the finance view into contact with the money view, and Fischer clearly took this step. When he died however, he was still thinking of the constraint on market liquidity as deriving fundamentally from dealer capital, not dealing funding.

The collapse of LTCM in 1998 taught a second lesson, or should have. Fischer Black died in 1995, but presciently warned about the risk involved in the relative value investment strategy that LTCM was using. In retrospect we recognize that their strategy was loading up on liquidity risk, and when liquidity dried up they could not refinance their position.

Lesson 2: The ability of dealers to provide market liquidity depends on their own <u>funding</u> liquidity.

But what does funding liquidity depend on? Here we find the final link in the chain that brings the finance view into contact with the money view.

Lesson 3: The ultimate source of funding liquidity is the <u>central bank</u>, for the simple reason the ultimate means of payment is the liability of that bank which it can expand or contract.

By the time he died, the education of Fischer Black had proceeded through Lesson 2, but not yet Lesson 3. That is my extrapolation, and I wish Fischer had lived so I could suggest it to him. Because the implication of Lesson 3 is that monetary policy is not a charade. The answer to the challenge of finance is the money view.

The future of banking

In this course we have been conceptualizing banking as being essentially about **selective** enforcement (discipline) and relaxation (elasticity) of the survival constraint. The importance of this function is two-fold. On the one hand it means that agents who have accumulated obligations to pay that they cannot now meet can, if the banking system lets them, put off the problem until some time in the future when perhaps they will be better able to meet their obligations. On the other hand it means that agents who have brilliant plans for the future that they cannot now realize for lack of spending power can, if the banking system lets them, issue obligations to pay in the future.

The dead hand of the past   The ephemeral dream of the future

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              \                          /
               \                        /
        The survival constraint
         in the present
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In helping to postpone realization of failure, and to anticipate realization of success, banks take on risk. They make the payments that the agents are not (yet?) themselves able to make. In this sense the essential core of the banking function is the **selective bearing of liquidity risk**. So long as there is liquidity risk, there will be a role for banks, and not only that, a crucial allocative role.

From a policy perspective, the question of regulation revolves around "externalities", which is to say all the ways in which private profit motive for selective bearing of liquidity risk deviates from the larger social good. The problem is that, the more liquidity risk banks bear, the more they charge for an additional unit, until ultimately they are unwilling to bear any more and the system breaks down. We have seen how, in this instance, central banks can help by serving and lender and dealer of last resort. It follows that they can also help by intervening earlier on when the deviation between private and social begins to widen.