

TECHNOLOGICAL CHANGE, FINANCIAL INNOVATION, AND FINANCIAL  
REGULATION IN THE U.S.: THE CHALLENGES FOR PUBLIC POLICY

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I. Introduction

The financial services sector in the United States is experiencing an era of rapid innovation. These changes are fueled by the rapid improvements in the two technologies -- data processing and telecommunications -- that are at the heart of financial services. The financial services sector is also one of the most heavily regulated sectors in the U.S. economy -- despite two decades of widespread deregulation.

Though technological improvements and innovations are almost always healthy and beneficial for an economy, they can place serious strains on the incumbents in a particular industry or sector on which they are focused, and they may create challenges for public policy, especially in a heavily regulated industry. This has certainly been true for financial services. Further, the heavy overlay of government regulation on the financial services sector has certainly influenced the course of financial innovation and, in turn, been influenced by it.

This paper will provide an overview of these interactions between financial innovation and financial regulation.<sup>1</sup> Regulation clearly can be a hinderance to innovation; sometimes it may be a spur to innovation. And actual or prospective innovation may, in turn, be an important precursor

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<sup>1</sup> This paper draws heavily on White (1996a) and Horvitz and White (1996); see also Saunders and White (1986). I have also benefitted greatly from the New York Academy of Sciences' Discussion Series on "Technology and Finance" held during the spring of 1996.

to subsequent regulation. The social welfare consequences of these complex interactions, and the implications for the development of public policy, are themselves a challenge to disentangle; but an understanding of the processes of innovation and of regulation can clarify the interactions and thus help to structure the public policy debate.

The remainder of this paper will proceed as follows: The remaining portion of this Section will establish an important distinction among types of financial institutions, which will prove useful in the subsequent discussion of financial regulation. Section II will provide an overview of financial innovation. Section III will describe the broad picture of U.S. financial regulation: its structure, processes, and rationale. Section IV will then focus on a number of current areas in financial services where issues of innovation and regulation intersect. Section V will provide a brief conclusion.<sup>2</sup>

#### A. A Classification of Financial Services Providers.

At the beginning, an important distinction among firms in the financial services sector is worthwhile: between financial intermediaries and financial facilitators. Financial intermediaries are firms that hold financial assets (e.g., loans, mortgages, bonds, equity securities) and issue liabilities (such as deposits, insurance policies, pension obligations, mutual fund shares, etc.) on themselves, thereby intermediating between their liability holders and the ultimate investments to which their liability holders' funds have been devoted. Familiar types of financial intermediaries include banks and other depository institutions (such as savings banks, savings and loan associations, and credit

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<sup>2</sup> Also, because discussions of technology and of government regulation inevitably involve concepts and organizations that are identified through abbreviations, we also provide an Appendix with a glossary of the abbreviations used in this paper.

unions); insurance companies; pension funds; mutual funds; mortgage conduits; finance companies; leasing companies; and venture capital firms. The liabilities of these financial intermediaries constitute important assets for the nonfinancial business and household sectors of the U.S. economy. In addition, firms that are not usually considered to be part of the financial sector are increasingly acting as financial intermediaries. Every company that extends trade credit to its customers (e.g., allowing payment to be due 30 or 60 days after the delivery of goods or services) is acting as a lender; in some cases, these trade credit arrangements have subsequently led to formal finance company arrangements, such as General Motors' GMAC affiliate or General Electric's GE Capital. And some companies, such as AT&T, have explicitly plunged into financial services through the issuance of credit cards.

The second category of firms -- financial facilitators -- facilitate the financial transactions between the primary issuers of financial liabilities -- e.g., governments, enterprises, and household borrowers -- and the investors who purchase these instruments (and in whose hands they are financial assets). In this category are stock brokers, securities underwriters, market makers, dealers, investment bankers, mortgage bankers, mortgage brokers, financial advisers, rating agencies, accountants, financial analysts, and the financial press. Though firms in some of these categories may hold some financial assets, their holdings are largely incidental to their facilitating roles.

Many firms in the financial services sector straddle the intermediary/facilitator boundary. For example, many stock brokerage firms also manage and sell mutual funds; and commercial banks are increasingly entering various aspects of the securities industry. Still, the distinction between intermediaries and facilitators will prove useful in understanding the structure and role of financial regulation in the U.S. and in understanding the pressures and strains that some forms of

technological innovation (e.g., the expansion of non-traditional lenders, and the processes of securitization) are placing on some financial sector firms (e.g., traditional portfolio lender intermediaries, such as banks).

## II. Financial Innovation

### A. Some General Concepts.

Innovation consists of firms' developing new products (or services) and/or new production processes. Often, but not always, the new products are based on new processes; sometimes also new organizations -- organizational innovations -- are involved. In essence, innovation involves new ways of doing things.

The conditions that spawn or encourage innovation are multi-faceted.<sup>3</sup> Among the important influences are:<sup>4</sup>

- the nature of the technology underlying the industry and the rate of change of that technology;
- the structure (e.g., firm size) and competitiveness of the industry;
- the economic environment of the industry; and
- the regulatory environment of the industry.

### B. Applications to the Financial Sector.

Innovation -- product and process -- is not new to the financial services sector. Firms in the various subsectors of finance (e.g., banking, securities, insurance, etc.) have a long history of developing new instruments and services and of developing improved "back office" processes to

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<sup>3</sup> Surveys can be found in Cohen and Levin (1989) and Scherer and Ross (1990, ch. 17).

<sup>4</sup> Of course, in a market-oriented economy the profit-seeking behavior of individuals and enterprises is the underlying basis for innovation.

reduce the costs of existing services and to support the offering of new ones.<sup>5</sup> Further, even the electronics-based technological innovations that have attracted much attention recently are not new to financial services. The development of the telegraph in the 1840s soon led to its use for wire transfers of funds and for the dissemination of price information ("quotes") with respect to gold and securities that were traded on various exchanges, nationally and internationally.<sup>6</sup> The invention of the telephone in 1876 was followed the next year by the first commercial installation of telephones -- by two bankers.<sup>7</sup> Large branch-office brokerage firms' extensive use of the telegraph and the telephone soon earned them the descriptive term "wire houses." The electronic funds transfer (EFT) system of the FedWire was developed shortly after the establishment of the Federal Reserve in 1913.

Nevertheless, the pace of innovation clearly has quickened dramatically since the late 1960s; by contrast, the pre-1960s decades seem quite placid and staid. Consistent with the list provided above, there are at least four underlying causes, often with mutually interacting effects on innovation, that can help explain this near-revolution in financial innovation that has occurred.<sup>8</sup>

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<sup>5</sup> A brief history of financial innovation can be found in Allen and Gale (1995); see also Van Horne (1985), Miller (1986; 1992), Finnerty (1992), Merton (1992), and Lea (1996).

<sup>6</sup> See, for example, Garbade and Silber (1978).

<sup>7</sup> See Brooks (1975, p. 53).

<sup>8</sup> In addition to the causes discussed in the text, there appears to be at least one additional motive for financial innovation: reducing the tax burden on financial instruments and transactions. To the extent that some kinds of instruments and transactions are taxed less than others, there is a strong incentive to try to recast or re-engineer those that are in the high-tax categories so that they then qualify for more favorable tax treatment. For example, if capital gains are taxed more lightly than other forms of income (or they are taxed on a realization, rather than accrual, basis), there is an incentive to create instruments that convert dividend or interest payments into capital gains; similarly, if interest payments are a deductible expense to companies but dividend payments are not, innovation will focus on instruments that convert the latter into the former. For further discussion, see Campbell (1988, ch. 16) and the references cited there.

First, the underlying technologies of finance -- data processing and telecommunications -- have themselves undergone near-revolutions, becoming dramatically more powerful and less costly on almost a daily basis. These improved technologies have allowed "financial engineers" better to amass data, assess risks, and thereby design new products and services that can better meet the financial demands of individuals and enterprises. And these products and services can be offered across wide geographic areas. The securitization of many categories of previously illiquid loans -- most notably, residential real estate mortgages and credit card receivables -- and the offering of credit card services nationally from remote locations (e.g., South Dakota) are good illustrations of these developments.

Second, legal and regulatory changes -- generally in the direction of less restrictiveness and less protectionism (i.e., deregulation) -- have reinforced these technological improvements, yielding heightened levels of competition throughout the financial services sector. In turn, these greater competitive pressures have forced incumbents to find improved and less costly ways of providing financial services, and deregulation has made it easier for innovators to enter these markets.

Third, the U.S. economic environment changed sharply. After two postwar decades of relatively steady economic growth, low inflation rates, low interest rates, and fixed foreign exchange rates -- in short, an economic world of modest fluctuations and apparently low risks -- the U.S. economy began traveling over a much rockier road. Inflation rates became higher and more variable in the late 1960s and the following decade and a half, as did interest rates. Foreign exchange rates were unfixed in 1971 and have mostly fluctuated since then. In sum, the world had become a much riskier place by the early 1970s, and the demand for financial instruments to buffer and hedge some of these heightened risks grew commensurately. The development of financial futures and options,

most notably by the exchanges located in Chicago, was a direct response to this demand.

Fourth, the dense regulatory structure (to be discussed in Section III) that envelopes much of the financial sector has also been influential in inducing innovation.<sup>9</sup> In the 1970s, especially, some important innovations were inspired by efforts to avoid or circumvent regulatory restrictions. For example, the Banking Act of 1933 required that the Federal Reserve (through its "Regulation Q") restrict the interest that banks could pay on deposits.<sup>10</sup> In the inflationary and higher-interest-rate environment of the 1970s, these constraints became tightly binding, which motivated a number of circumventing innovations. Three notable innovations were the development of the money market mutual fund, the offering of interest-paying checking accounts by credit unions and by savings banks in the Northeast, and the development of the "sweep account" by commercial banks (whereby banks would "sweep", on an overnight basis, idle checking account funds of their customers into interest-bearing securities).<sup>11</sup> Similarly, the Glass-Steagall Act of 1933 has prevented securities firms from owning and operating a commercial bank (and vice versa).<sup>12</sup> This constraint

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<sup>9</sup> Regulation can also inhibit innovation. For example, U.S. securities regulation for many decades prohibited the development of mutual funds that held as assets the shares of other mutual funds; and options on commodities have been prohibited since the 1930s.

<sup>10</sup> Most of the "Reg Q" restrictions were phased out in the early 1980s; the prohibition on banks' paying interest on the checking accounts of commercial customers still stands, however.

<sup>11</sup> Also, though Regulation Q did not directly cause the development of "repurchase agreements" or "repos" (which are, in essence, short-term loans involving securities as the collateral), it greatly encouraged their use by banks as substitutes for deposits.

<sup>12</sup> In the past two decades sharp-eyed lawyers, aided and abetted by bank regulators and the courts, have found a number of loop holes in the Glass-Steagall barrier between commercial and investment banking, so that the barrier has become increasingly porous. Nevertheless, as a first approximation, the separation remains a significant phenomenon -- as is witnessed by the substantial (but thus far futile) lobbying efforts that the commercial banking industry has devoted (for over 20 years) to erase it legislatively and the equally substantial (and thus far successful) efforts of the securities industry and more recently the insurance agents to maintain it. Similar erosions have

was part of the motivation for Merrill Lynch to develop (and to patent) its "Cash Management Account" (CMA), which allowed customers to buy and sell securities, earn interest on idle funds, write checks, and have a credit card -- all linked to a common account. Since the late 1980s the progressive easing of many regulatory restrictions has in turn encouraged financial innovation; the development of customized swaps, hedges, and other derivative instruments in the late 1980s and early 1990s -- by commercial banks as well as by securities firms -- is a good illustration of the results of this regulatory loosening.

In sum, financial innovation has been influenced by a number of important environmental factors, including the regulatory framework in which much of finance is embedded. It is to an elucidation of that framework that we now turn.

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occurred in the barrier erected by the Bank Holding Company Acts of 1956 and 1970 between the banking and insurance industries; but, again, as a first approximation, the barrier remains a significant phenomenon.

### III. Financial Regulation

There is no satisfactory way to provide the full picture of financial regulation, with its excruciating detail and labyrinthine complexities, in any compact form.<sup>13</sup> Nevertheless, in this section we will attempt, with the aid of some clarifying devices, to provide some of the flavor and main features of financial regulation in the U.S.<sup>14</sup> We will first develop some broad principles concerning regulation in general and then turn our focus specifically to financial regulation.

#### A. A Clarifying Trichotomy.

At first glance, regulation may appear to be an undifferentiated mass of governmental intervention into the operations of private-sector firms and markets. There are, however, enough regularities and patterns in regulation generally that it is useful to classify regulation into three major categories:

1. Economic regulation. This encompasses direct controls on prices, profits, entry, and/or exit, including "must serve" requirements. Familiar non-financial examples include the states' regulation of electricity prices and profits and localities' regulation of taxicab fares and entry.

2. Health-safety-environment regulation. This encompasses restrictions on production processes and product types and qualities. Familiar examples include the U.S. Environmental Protection Agency's restrictions on air pollutant emissions by electric utilities, the Occupational

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<sup>13</sup> Indeed, the texts of the complete sets of laws and regulations that apply to the financial sector occupy multiple linear feet on the bookshelves of any legal library.

<sup>14</sup> Further and more detailed descriptions of financial regulation can be found in White (1986, 1994), Campbell (1988, chs. 13-15), Bronfman et al. (1994), and Gramm and Gray (1994).

Safety and Health Administration's restraints on workplace hazard exposures, and the Consumer Product Safety Commission's restrictions on unsafe consumer products.

3. Information regulation. This involves requirements that specific types of information be attached to products and services. The U.S. Department of Agriculture's food labeling requirements and the Food and Drug Administration's labeling requirements for pharmaceuticals are ready examples.

These three categories are not always airtight or mutually exclusive. Some forms of regulation defy easy categorization or seem to encompass more than one category. Still, as will be seen below, these three categories will help us organize financial regulation into comprehensible bundles and will help link the types of financial firms, the motives for regulation, and the forms of regulation.

## B. Motives for Regulation.

In an ideal world, governmental regulation would be a "public interest" tool for correcting the shortcomings of private-sector markets. These potential market imperfections include:

- The exercise of market power by sellers (monopoly, oligopoly) or by buyers (monopsony);
- Pervasive economies of scale in production;
- Positive or negative externality (spillover) effects;
- Public goods problems;<sup>15</sup>

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<sup>15</sup> "Public goods" are goods or services for which the extra costs of serving an extra user are very low or zero and from which extra users cannot be excluded. Familiar examples are police protection, national defense, an unscrambled broadcast signal, a public health/disease eradication campaign, and the availability of a new idea.

- Pervasive uncertainty;
- Asymmetric information on the part of marketplace transactors;
- "Widow and orphan" marketplace transactors who cannot be trusted to make appropriate choices for themselves.

In addition to these deviations from the textbook model of the ideal market, regulation may be motivated by a society's dissatisfaction with the income-distribution outcome of even perfectly efficient market processes and thus by the desire to redistribute income in directions that are deemed socially more desirable.<sup>16</sup>

In this ideal world, regulators would costlessly and perfectly correct the imperfections of markets and improve the distribution of income and thus improve the social efficiency of markets. For example, economic regulation would be used to limit the exercise of market power, health-safety-environment regulation would be used to correct externalities, information regulation would be used to correct information asymmetries, etc.

Unfortunately, in the real world, governmental organizations and their regulatory processes too are possessed of imperfections. These include:<sup>17</sup>

- Difficulties in formulating clear and implementable goals;
- Difficulties in establishing incentives for efficiency;
- Difficulties in attracting and retaining capable managers; and
- Problems of asymmetric information between regulators and the parties they are supposed to regulate.

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<sup>16</sup> Though taxes and subsidies are the more common tools for effecting income redistribution, some regulatory measures clearly have this goal as well. See Posner (1971).

<sup>17</sup> Further discussion can be found in Demsetz (1969), Wolf (1989), and White (1996b, 1996c).

Further, because the consequences of regulations are often substantial and the rewards to influencing the regulatory processes in one's favor are quite large, the pursuit of that influence and success in achieving it<sup>18</sup> can lead to serious distortions and inefficiencies, as affected parties pursue (and achieve) regulatory restrictions and protections that enrich these successful participants at the expense of others (and at the expense of marketplace efficiency).<sup>19</sup> The end result could well be inefficiency losses that are at least as substantial as the market imperfections that the regulatory process was nominally supposed to correct. Indeed, the wave of deregulation that swept through the U.S. economy in the late 1970s and early 1980s -- which involved the dismantling of much economic regulation of airlines, railroads, trucking, telecommunications, and banking<sup>20</sup> -- represented a political judgment that the costs of economic regulation in these areas exceeded their benefits.<sup>21</sup>

With imperfections present in regulatory processes, as well as in market processes, there are no assurances of purity of motives in regulation nor of efficiency of outcomes. All judgments about the necessity for and efficacy of regulation must have an empirical basis and cannot be settled solely by a priori reasoning about the imperfections of markets or of governments.

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<sup>18</sup> This success is frequently described as the "capture" of a regulatory agency by a specific interest group.

<sup>19</sup> See Stigler (1971), Posner (1974), Krueger (1974), Peltzman (1976), and, for a survey, Noll (1989).

<sup>20</sup> The dismantling in the early 1970s of the system of fixed commissions for securities transactions, which had received regulatory support during the previous 40 years, should also be included in this category.

<sup>21</sup> For economists' support for this position, see, for example, Winston (1993) and Joskow and Noll (1994). Unfortunately, in one instance (savings and loan associations) crucial safety regulation was swept aside as well, with disastrous consequences. See White (1991).

### C. The Structure of American Financial Regulation.

There is no uniform or neatly delineated way of describing the regulatory structure that applies to the American financial services sector. American financial regulation is a complex interleaving of multiple federal and state regulatory agencies, often with overlapping jurisdictions and responsibilities among the federal agencies and between the federal and state authorities.<sup>22</sup> Rather than attempt any grand synthesis, we shall proceed case-by-case through the major sub-sectors of finance.<sup>23</sup>

1. Banking. Banks and other depositories are regulated by both the Federal Government and the individual 50 states. At the federal level, there are three agencies (the Federal Reserve, the Federal Deposit Insurance Corporation [FDIC], and the Office of the Comptroller of the Currency [OCC]) with regulatory responsibilities for commercial banks and their holding companies. Another agency (the Office of Thrift Supervision [OTS]) regulates savings institutions (as does the FDIC, because of its deposit insurance responsibilities); and yet another federal agency (the National Credit Union Administration [NCUA]) regulates credit unions.<sup>24</sup> At the state level, each state has a banking regulatory agency, which usually encompasses all depository institutions; a few states have

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<sup>22</sup> For the banking sector alone, efforts to portray regulatory structure and responsibilities yield multi-page charts and/or diagrams that could easily be mistaken for radio wiring diagrams; see White (1991).

<sup>23</sup> In addition to the specific regulatory structures mentioned, the U.S. Department of Justice's (DOJ) Antitrust Division maintains antitrust scrutiny over the financial sector, and the DOJ's Civil Rights Division enforces the anti-discrimination laws that apply to the provision of financial services. Also, virtually all firms in the financial sector are subject to the general reach of the U.S. workplace safety laws, anti-employment discrimination laws, etc.

<sup>24</sup> Also, the Farm Credit Administration (FCA) regulates a panoply of specialized agricultural lending institutions, and the Federal Housing Finance Board (FHFB) regulates the 12 Federal Home Loan Banks (FHFBS), which provide wholesale credit to savings institutions and commercial banks for the purpose of housing finance.

separate agencies for separate types of depositories.

Over time the Federal Government has tended increasingly to centralize bank regulation and to reduce the states' powers. Nevertheless, the tradition of a "dual banking system," with bank charters granted (and regulated) both nationally and by the states, is a strong one,<sup>25</sup> and the states still play an important role in bank regulation.

2. Securities and related instruments. The Federal Government and the 50 states share responsibility for regulating this area. At the federal level, the Securities and Exchange Commission (SEC) supervises securities (and mutual fund) issuance and trading and the information disclosure that surrounds these transactions, as well as corporate governance procedures; the Commodity Futures Trading Commission (CFTC) has jurisdiction over commodity and financial futures and options on futures. At the state level, the primary focus is on securities (and mutual fund) sales and corporate governance, the latter through state corporate chartering and corporate law development.

3. Insurance. Regulation of the insurance industry is the sole responsibility of the individual 50 states; also, virtually all states operate mutual guarantee funds that honor the obligations of an insurance company that fails.

4. Pension funds. The regulation of pension funds is largely a federal responsibility. The Department of Labor's (DOL) Pension and Welfare Benefits Administration has broad responsibility for all private-sector pensions; the Pension Benefit Guaranty Corporation (PBGC) focuses exclusively on defined-benefit pension plans.

5. Mortgage conduits. The Federal National Mortgage Association ("Fannie Mae") and the Federal Home Loan Mortgage Corporation ("Freddie Mac") are Congressionally chartered private

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<sup>25</sup> See Scott (1977).

corporations<sup>26</sup> that purchase residential mortgages and then package and sell (securitize) most of them and hold the remainder in portfolio.<sup>27</sup> The U.S. Department of Housing and Urban Development's Office of Federal Housing Enterprise Oversight (OFHEO) has regulatory responsibility for these two housing conduits.

6. Finance companies and leasing companies. There are no formal regulatory structures that apply to finance companies and leasing companies, though they are affected by some of the regulatory strictures (e.g., some states' usury ceilings on loan interest rates) that apply to other financial sector firms.

#### D. The Content of American Financial Regulation.

As is true of the structure of financial regulation, the content of financial regulation defies easy or compact description. Again, we shall proceed on a case-by-case basis through the sub-sectors of finance, employing also the trichotomous classification of regulation established above.

1. Banking. The burden of economic regulation has been growing lighter on banks, in keeping with the general trend of deregulation in the U.S. economy over the past two decades. Nevertheless, the vestiges are significant. Some important examples follow: At the federal level, banks cannot pay interest on the checking accounts of commercial customers. Their activities in the securities and insurance areas are restricted, and both they and their holding companies are restricted

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<sup>26</sup> The term "government sponsored enterprise" (GSE) is frequently used to describe these (and similarly structured) companies.

<sup>27</sup> The third major federal mortgage conduit, the Government National Mortgage Association ("Ginnie Mae"), is directly a part of the U.S. Department of Housing and Urban Development (HUD).

to owning enterprises that are closely related to banking.<sup>28</sup> Banks have a regulatory obligation to meet the financial needs of the communities in which their offices are located. At the state level,<sup>29</sup> a number of states have retained limits on intra-state and interstate branching and on the share of the state's deposits that can be amassed by any individual bank or bank holding company. Some states have usury ceilings on the interest rates that can be charged on certain kinds of loans; and some states place limits on certain kinds of loan fees, such as credit card fees.

Safety-and-soundness regulation is a primary concern of the federal bank regulators, with the states playing a supporting role. The primary regulatory instruments employed include minimum capital (net worth) requirements, deposit insurance requirements,<sup>30</sup> activities and portfolio limitations, "good character" requirements for senior bank personnel, business competence requirements, and overall risk limitations. Enforcement occurs through the processes of "examination and supervision."

Information regulation is primarily a federal responsibility. Banks are required to inform borrowers and depositors of interest rates and other fees, calculated in a standardized way (so as to ease comparisons among competitive institutions' offerings). A bank must also provide a copy of its most recent financial statement to any customer who asks for it.

2. Securities and related instruments. The financial firms that operate in this sub-sector

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<sup>28</sup> Savings institutions ("thrifts") enjoy a loop hole in this area. Thrift holding companies that own only one thrift have few restrictions on the types of enterprises that they can own.

<sup>29</sup> Most of the state restrictions apply to banks operating in their states, regardless of whether the bank is state-chartered or nationally chartered.

<sup>30</sup> Depositors in banks, thrifts, and credit unions are covered by deposit insurance, up to \$100,000 per insured account.

enjoy a relatively light burden of economic regulation.<sup>31</sup> Nevertheless, the Glass-Steagall Act, which restricts banks from entering the securities business, equally restricts securities firms from entering banking.<sup>32</sup> The SEC supervises the creation and operation of securities exchanges and the types of instruments that can be traded on them; the CFTC does the same for the exchanges and instruments that are within its domain. Also, the Federal Reserve continues to have the power to set margin requirements -- the percentage amount that a securities firm or bank can lend to an investor who puts up his/her securities as collateral for the loan.

The safety regulation burden on this sub-sector (and on corporate governance generally) is heavier. An important goal of the SEC, CFTC, and the states is to protect investors from arbitrary or abusive practices. Thus, corporate governance requirements can be seen as efforts to make corporate managements accountable to the corporations' boards of directors (who are elected by and are supposed to represent the shareholder owners) and ultimately to their shareholders, thereby providing a less arbitrary environment for investors; similarly, regulatory limitations on exchanges, their instruments, and their trading practices and on the practices of the personnel of securities firms and investment advisers are efforts to protect investors from abusive practices by more knowledgeable or manipulative securities (or futures) firms. In addition, the SEC imposes minimum capital requirements on broker-dealers,<sup>33</sup> and it restricts the percentage of low-quality (high-risk)

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<sup>31</sup> It should be noted, however, that prior to the early 1970s the SEC supervised and protected the securities industry's system of minimum fixed commissions on securities transactions. See Mann (1975), Schwert (1977), Ofer and Melnik (1978), Roberts, Phillips, and Zecher (1979), and Tinic and West (1980).

<sup>32</sup> But see the caveats of footnotes 12 and 28 above.

<sup>33</sup> Also, investors who trade through and have an account with a securities firm (which often involves leaving securities and/or cash on accounts with the firm) are protected through insurance up to \$500,000 provided by the federal Securities Investor Protection Corporation (SIPC).

debt securities that money market mutual funds can carry in their portfolios.

Finally, the securities sub-sector (and the larger world of publicly owned companies with traded securities) carries an extremely heavy burden of information regulation. When companies issue new securities, they (and their underwriters-distributors) are required to make extensive disclosures. Thereafter, as publicly traded companies, they are required to make extensive financial information available on a quarterly and annual basis and to reveal important new financial developments as they occur. Further, as a means of enhancing disclosure and also enhancing comparability among companies, the SEC enforces the basic accounting system (usually described as "generally accepted accounting principles" [GAAP]).<sup>34</sup> In addition, mutual funds are required to report their net market values on a daily basis and to report other information (such as recent returns) on a standardized basis, so as to enhance comparability.

3. Insurance. The state regulatory regimes that apply to the insurance industry roughly parallel the overall regulatory structure that applies to banking.<sup>35</sup> In the realm of economic regulation, many states maintain minimum and/or maximum rate regulation on various lines of insurance and impose "must serve" requirements.<sup>36</sup> Also, the federal Bank Holding Company Acts of 1956 and 1970, which restrict the ability of banks from owning insurance companies, similarly limit the ability of insurance companies to own banks. Safety regulation largely mimics federal

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<sup>34</sup> The initial arbiter of GAAP is the Financial Accounting Standards Board (FASB), an independent non-governmental body; but the SEC can overrule the FASB in the setting of GAAP (and the Congress can ultimately overrule the SEC).

<sup>35</sup> See Kopke and Randall (1991), Randall (1995), and White (1996d).

<sup>36</sup> Automobile liability insurance and health insurance are "popular" areas of maximum rate regulation; flood and disaster insurance, homeowner insurance, and auto insurance are areas of "must serve" requirements.

banking regulation, with minimum capital requirements, portfolio and activities limitations, etc. Finally, information regulation calls for the disclosure of key features of insurance policies, often in standardized terms so as to facilitate comparisons.

4. Pension funds. The Federal Government's regulatory efforts constitute a mixture of safety regulation and information regulation. Pension funds are expected to meet "prudent person" standards with respect to investments and diversification and are required to provide pension plan participants with periodic summaries of their plans. Further, the PBGC enforces adequate funding standards for the defined-benefit plans that it guarantees.

5. Mortgage conduits. The OFHEO focuses on safety regulation of Fannie Mae and Freddie Mac, primarily through minimum capital requirements.

6. Finance and leasing companies. Information regulation is the major form of regulation that affects these companies, through disclosure requirements of lending terms. As noted above, these companies are subject to any state-imposed usury ceilings or credit-card fee limitations.

#### E. A Summing Up.

Though the landscape of financial regulation is exceedingly complex and variegated, there are some patterns -- incorporating the intermediary-facilitator dichotomy of financial firms and the economic-safety-information regulatory trichotomy that we have developed -- that can be discerned.

First, the widespread nature of financial regulation is not accidental. Finance is a vital input for every business enterprise and governmental entity, and virtually all households are customers of one or more financial services (as depositors, investors, pension beneficiaries, and/or borrowers). The liabilities of major classes of financial intermediaries -- i.e., bank deposits, insurance company

policies, pension plan benefits, and mutual fund shares -- constitute significant fractions of the assets of households and businesses. At the same time, financial markets do seem to be especially susceptible to the types of potential market failures that invite governmental intervention.

Second, of the three categories of regulation, information regulation extends most widely across the financial sector. Again, this ubiquity is not accidental. It arises because of the politically expressed belief that finance is complicated and thus that many or most of the customers of financial services are at an informational disadvantage vis-a-vis the purveyors of these services.

Third, safety regulation applies most directly and forcefully to the groups of financial intermediaries -- depositories, insurance companies, and pension funds -- whose liabilities (deposits, policies, and benefits) are widespread and important assets for households.<sup>37</sup> These are also the categories of intermediary that have government-backed insurance or guaranty plans backstopping their liabilities, though in all instances the safety regulation of these institutions (and thus the governmental concern about the safety of their liabilities) has preceded these backstop plans. Political concerns about the inability of these institutions' liability holders to protect themselves against losses, as well as concerns (in the case of depositories) about depositor runs and financial contagion, have clearly been important motivators for this safety regulation and for the governmental backstopping efforts.<sup>38</sup>

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<sup>37</sup> Mutual funds are the exception here. They are a newer form of intermediary than the ones mentioned in the text, and they are explicitly recognized to be risky. But money market mutual funds -- the exception to the exception -- are subject to safety regulation.

<sup>38</sup> Though the presence of these backstopping plans supports a legitimate interpretation of safety regulation as an effort by government to prevent these financial intermediaries' failures so as to protect its obligations, the extensive safety regulation that preceded these plans argues strongly that there are deep political concerns about preserving the safety of these liability-obligations in the hands of households and nonfinancial businesses, irrespective of the presence or absence of government guarantees.

The safety regulation that applies to securities firms and other financial facilitators (and, via corporate governance regulation, to the entire corporate sector), is less forceful and less direct. It does not try to provide complete safety of investments to investors but rather to reduce the possibilities of losses due to fraudulent dealings, unsuitable advice, manipulation, or other abusive practices.

Fourth, economic regulation applies most extensively to banks and other depositories, and to a lesser extent to the insurance industry. This focus on banks is surely a legacy of nineteenth century American populism and the perception that banks are large, financially powerful, and somewhat mysterious in structure and operation.<sup>39</sup> The reality that banks are increasingly embedded in competitive markets for financial services and that banks collectively account for a steadily shrinking share of the U.S. economy's financial assets -- today, less than 25%<sup>40</sup> -- has helped underpin the economic deregulation of banking that has occurred since the late 1970s.<sup>41</sup> Still, the political perceptions and fears of size, power, and mystery persist, as does a substantial amount of economic regulation.<sup>42</sup>

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<sup>39</sup> This last element is again the product of the perception that finance is complex. Also, banks (and insurance companies) are among the few retail operations frequently encountered by households and small businesses that may decline to "sell" their products (loans, or insurance) to potential customers, thus giving rise to popular perceptions of great and arbitrary power and to political demands to tame that power through economic regulation. For further discussion, see White (1993, 1995).

<sup>40</sup> This decline has been more-or-less continuous for well over a century. See Litan (1986) and White (1991; 1993; 1995).

<sup>41</sup> See White (1986; 1994).

<sup>42</sup> Paradoxically, much of the economic regulation of banks has inhibited competition among banks and between banks and other financial services providers, thereby exacerbating market imperfections and inefficiencies rather than ameliorating them. For an explanation of this paradox, see White (1993; 1995).

We now turn to some of the interactions between financial innovation and financial regulation.

#### IV. Financial Innovation and Financial Regulation: Current Issues

As Section II indicated, financial innovation is proceeding rapidly. It has multiple manifestations:

- New instruments, such as financial options and futures and stored-value and "smart" cards;
- Modifications to traditional instruments, such as securitized loans;
- New services, such as PC-based home banking;
- New exchanges for trading securities, such as the Cincinnati Exchange (which is exclusively computerized);
- New opportunities for the users and purveyors of financial services to access each other, over wider geographic areas (including the crossing of national boundaries).<sup>43</sup>

In turn, this innovation has important consequences for financial markets:

- The users of financial services have more choices and opportunities, including the opportunities to make mistakes;
- The incumbent purveyors of financial services face more competition, as do exchanges and even regulators;<sup>44</sup>
- The possibilities and probabilities of financial failure among the purveyors of financial services increase;
- The tasks of financial regulation become more complex.

In this Section we will explore a number of important issues involving the direct and indirect

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<sup>43</sup> The dismantling of geographic and product-line regulatory barriers, nationally and internationally, is clearly aiding this process.

<sup>44</sup> See Coffee (1995) and White (1996c).

interactions between financial innovation and financial regulation. We will begin with the potential effects of regulation on innovation; we will then discuss the challenges for regulation (i.e., for public policy) that are posed by the rapid pace of innovation in and around the financial sector.

#### A. The Effects of Regulation on Innovation.

It is clear that financial regulation may, in some circumstances, encourage innovation; in others, it may inhibit innovation. These circumstances, and their consequences, warrant further discussion.

1. Regulation is intended to prevent enterprises and individuals from pursuing specific courses of action. As the Regulation Q-induced examples of Section II illustrate, the gain-seeking inclinations of enterprises and individuals are likely to induce innovations that allow them to achieve the same or similar ends through alternative means.

Are such innovations socially beneficial? Or are they anti-social regulatory evasions? The answers to these questions must hinge largely on a "from-the-outside" perspective on the specific regulation itself and a weighing of its social worthiness. If, for example, one believes that the regulation is wrong-headed<sup>45</sup> (as is this author's judgment about Regulation Q, including its current vestiges), then the innovations are a welcome and beneficial relief from the ill-advised regulation -- albeit, at some extra costs (of developing the innovation and also of pursuing the desired activities through the indirect innovation-linked route rather than through the original but-for-the-regulation route). If, instead, one believes that the regulation serves a worthy purpose (and the innovation does

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<sup>45</sup> And has arisen and been maintained because of one or more of the governmental imperfections discussed in Section III.

not avoid or cure the social problem that is the target of the regulation but just permits the privately pursued activity to continue under another guise), then the innovation is simply regulatory evasion and is clearly a poor use of the economy's resources.

This "outside" perspective and the judgments based on it are thus crucial for any specific judgments about regulation-induced innovations.

2. The Balkanized structure of financial regulation in the U.S. -- with multiple federal agencies and 50 states -- has the potential for either encouraging or inhibiting innovation.<sup>46</sup> This structure may encourage innovation by offering multiple alternative forums -- multiple federal regulators and/or 50 states -- in which an innovator may achieve any needed regulatory approval. A single "no" from a single all-encompassing regulatory agency need not mean the final foreclosure of an innovation. On the other hand, if an innovation requires the scale of a national market and the 50 states have jurisdictional authority, the transactions costs of securing multiple approvals may discourage the innovation in the first place. Further, jurisdictional "turf wars" among regulatory agencies could delay approvals of innovations and thus discourage their development.<sup>47</sup>

Which of these effects would prevail would be dependent on the particular innovation and jurisdictional arrangement; no sweeping conclusion can be offered. Further, a judgment about the social value of the innovations that arise when innovators can "forum shop" among regulatory agencies again depends on an outside perspective on the social worth of the regulation that prohibits the innovation in some jurisdictions. If one believes that the regulation is worthwhile, then such forum shopping constitutes anti-social regulatory evasion and could lead to a "race to the bottom"

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<sup>46</sup> For alternative views, see Kane (1986, 1991), Coffee (1995), and White (1996c).

<sup>47</sup> Coffee (1995) offers some examples.

by compliant regulators who are reluctant to lose "market share"; alternatively, if one believes that the regulation is wrong-headed, then the forum shopping is beneficial and could lead to a "race to the top".

Again, the outside perspective is crucial for making any judgments.

3. The specialization confinements of financial regulation (e.g., restricting banks or bank holding companies from entering the securities or insurance fields, and vice-versa, and restricting banks from entering non-financial areas) may again have positive or negative effects on innovation. The nominal confinements may induce "evasive" innovations. Alternatively, these confinements may be inhibiting some innovations that would occur in and take advantage of the multi-product environment of the "financial supermarkets" that could arise in a less constricting regulatory framework.<sup>48</sup>

In sum, it is clear that financial regulation may be having both positive and negative effects on financial innovation and that any judgments as to the merits of these influences hinge crucially on one's views of the merits of the specific regulations themselves.

## B. The Effects of Innovation on Regulation.

1. The financial innovations that have geographically widened financial markets have clearly placed pressures on financial regulation to be centralized at the federal level and away from the states. This trend has been most prominent for banking and securities. It is likely to continue.

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<sup>48</sup> It should be noted, however, that one of the major attempts to construct a "financial supermarket" -- consisting of Sears (retailing), Allstate (insurance), Dean Witter (securities), Discover Card (credit cards), and MountainWest Savings and Loan Association (banking) -- did not prove successful.

2. These same innovational forces are causing the markets for some financial products and services to widen beyond national boundaries. Not too surprisingly, there are consequent calls for and efforts at international harmonization of financial regulation.<sup>49</sup> These efforts have gone the farthest in banking, followed by securities and then insurance.

Though there can be potential gains from international harmonization of financial regulation, there are serious dangers as well.<sup>50</sup> The gains can come from the harmonization of information regulation (e.g., in standardizing accounting frameworks and reporting requirements), so as to reduce the transactions costs of both the purveyors and users of financial services that cross national boundaries. Also, harmonization that serves as a guise for reducing protectionist barriers or governmental subsidies for financial firms among countries can be beneficial. But even the harmonization of information regulation carries the dangers that worthwhile local variations may be squelched and/or uniformity may be achieved at wholly inappropriate levels. More important are the dangers that international harmonization efforts could become smokescreens for international regulatory regimes that are protectionist and anti-competitive; unfortunately, there are precedents (in airlines, ocean shipping, and telecommunications) for this type of protectionist international regulatory regime to arise.

In short, there is much to be said for international competition, even among regulatory

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<sup>49</sup> See, for example, Siegel (1990), England (1991), Edwards and Patrick (1992), Stansell (1993), and Barfield (1996).

<sup>50</sup> See White (1996b, 1996c).

regimes,<sup>51</sup> and efforts at international harmonization should be approached gingerly at best.<sup>52</sup>

For the U.S. securities industry, a crucial issue will be whether international competition will place pressures on the SEC to loosen accounting and reporting standards -- because overseas capital markets, with looser standards (and consequent lower costs) become increasingly attractive to issuers and to investors<sup>53</sup> -- or whether the higher standards of the U.S. financial markets will prove so attractive to investors that overseas issuers will be drawn to these markets.

3. The increased competition created by the rapid pace of financial innovation is generally a beneficial force for the efficiency of financial markets and for the U.S. economy as a whole. Inevitably, this rapid change will create strong and uncomfortable pressures on incumbents. Some incumbents will successfully adapt; others will falter, merge, or possibly fail. Other firms will rise to take their places.

This pattern is to be expected and encouraged in a system of competitive markets. Nevertheless, the American political system is rarely comfortable with the prospect of substantial numbers of firms' failing. Incumbents may use this discomfort as the excuse to seek political

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<sup>51</sup> In essence, the case for international competition among regulatory regimes is much the same case that supports the multiple-regulatory-regime framework in the U.S. context.

<sup>52</sup> As is discussed in White (1996b, 1996c), even the arguments for international harmonization of safety regulation that rest on fears of the consequences of cross-border contagion of financial failures do not withstand close scrutiny; nationally based safety regulatory regimes, supplemented by informal coordination and communication among national regulators, should be adequate to deal with potential contagion problems; formal harmonization does not appear to be necessary.

<sup>53</sup> See Baumol and Malkiel (1992). It seems unlikely that, in the era of the global capital markets of the 1990s, the U.S. government would try to prevent U.S. firms from raising capital in overseas markets or to try to prevent U.S. investors from purchasing instruments issued overseas.

protection for their incumbency,<sup>54</sup> thereby stymying or delaying the efficiencies that innovation could otherwise bring.

Further, in the case of the intermediaries that warrant special safety regulation, and especially depositories and insurance companies, the increased competitive pressures do raise a set of legitimate regulatory concerns. In banking, for example, the competitive pressures are coming from a number of directions:

- from other banks, as the combination of improved technologies and reduced regulatory barriers allow banks increasingly to offer their services over wider geographic areas and thereby to invade each others' "turf" more extensively; the low-cost dissemination of financial information through the Internet (e.g., advertising the interest rates on deposits or on loans) will surely quicken this process;

- from other depositories, such as savings institutions, for the same reasons;

- from other intermediaries, such as insurance companies and finance companies, for the same reasons;

- from non-intermediary facilitators, through the process of securitization, which permits the previously illiquid assets (e.g., mortgage loans and credit card receivables) of banks to become securities and thus to be originated, serviced, and sold by financial facilitators (rather than being held in their portfolios only by banks);

- from firms that previously had little to do with finance, such as computer software companies that are likely to become purveyors of home electronic banking programs and services;

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<sup>54</sup> For example, the insurance agents' lobbyists have been successful in this respect, serving as the current barrier to the Congress's overhaul of the Glass-Steagall Act.

though these software firms are unlikely to become banks themselves, their brand-name prominence may allow them to insert themselves between banks and their retail customers and to become important "steerers" of those customers; banks will then have to compete to pursue the business (and customers) of these steerers.

Again, these innovations and the competition that they create ought not to be discouraged. But, because banks are special -- they do have a special safety regulatory regime, for the reasons discussed in Section III -- a special regulatory concern should surround this heightened competition.<sup>55</sup> Specifically, the safety-and-soundness scrutiny of bank regulators should be strengthened in a period of rapid innovation and heightened competitive pressures, because the owners and managers of faltering banks may be tempted to take "shoot-the-moon" risks at the expense of depositors (or deposit insurers).<sup>56</sup> Primary among the improved safety-and-soundness regulatory instruments should be improved capital standards, including better ways of measuring capital (i.e., the employment of a market value accounting framework) and of measuring risks (e.g., financial stress tests).

4. One important aspect of financial innovation has been the development of new financial instruments. Natural questions arise as to how these new instruments should be regulated (e.g., what forms of disclosure are appropriate) and by which regulators.

As the examples below illustrate, there are no automatic answers that can be offered to these

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<sup>55</sup> The same special concern should apply to insurance companies and pension funds, for the same reasons.

<sup>56</sup> The incentives for this risk-increasing strategy arise because, in a limited liability legal environment, the owners of the bank receive all of the upside gains from risk-taking but are limited in their liability for losses (which are borne by the liability holders, such as depositors or the deposit insurer that stands in their shoes). See White (1991).

questions. Decisions have to be made on a case-by-case basis. But bureaucratic rivalry over regulatory turf (possibly exacerbated by the protectionist fears of incumbents) ought not to be allowed to delay the delivery of the benefits and efficiencies of the new instruments.

5. Some innovative financial products (e.g., financial derivatives) have involved substantially greater levels of complexity than traditional products. When used appropriately, these new instruments can be tools for smoothing and hedging and thus reducing risks. But their greater levels of complexity and, often, their greater leveraging possibilities open new opportunities for risk-taking. In turn, these possibilities raise two dangers that are appropriate for regulatory concern. First, the complexity of these products may convert even sophisticated users of financial products into "widows and orphans" who use them inappropriately.<sup>57</sup> Second, the managers of financial intermediaries that pose the greatest safety regulatory concern (i.e., banks and other depositories, insurance companies, and pension funds) may use these instruments carelessly or as part of a deliberate risk-increasing ("shoot the moon") strategy.

Though the regulatory temptations to treat these complex products as the equivalent of nuclear waste and to prohibit their creation and use are great, these temptations should be resisted -- because their beneficial use as low-cost hedging instruments can also be great. Instead, regulatory remedies should be narrowly crafted to deal with the specific problems. For the "widows and orphans" problems, increased regulatory emphasis on the fiduciary obligations of financial intermediaries and facilitators is appropriate; and for the problems of increased risk-taking by

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<sup>57</sup> Arguably, this was the case for Proctor & Gamble's recent use of derivatives. In some instances, however, derivatives have been improperly blamed for losses that were created by deliberate risk-taking efforts that largely involved "old-fashioned" leverage. This was the case for the highly publicized (but generally misreported) losses of the Orange County, California, investment pool. See Figlewski and White (1995) and Jorion (1995).

intermediaries, increased regulatory emphases on "know your business and know your risks" and on better capital standards are the appropriate directions for public policy.

6. Stored-value cards and smart cards are electronics-based innovations that represent potential new means of effecting transactions. They are currently offered as telephone cards, transit cards, and university-based transactions cards; and experiments with general-purpose transactions cards are proceeding.

Should these instruments be treated by financial regulators as "money"? To do so would imply that only banks could issue these instruments or that the issuers should maintain adequate capital or otherwise collateralize the outstanding value of cards, thus treating issuers as quasi-banks.

To require this type of regulation at this early stage of development of these instruments seems premature and runs the risk of stunting or distorting their development. Further, the arguments for these strong forms of safety regulation are largely absent. Though most users are unlikely to be in a good position to judge the financial strength of card issuers, users are also unlikely individually to have large sums at risk;<sup>58</sup> and card holder runs seem unlikely and not especially contagious or damaging. Also, as accumulators of stored-value transactions, retail merchants will have stronger incentives (as well as greater capabilities) to monitor the financial strength of card issuers and will decline to accept the cards of weak issuers, thereby sending signals that households can use in their decisions as to whose issuers' cards to buy.

To this author's knowledge, there has not yet been a failure of a card issuer. When the first failure does occur, there will surely be media attention given to the unfortunate holders of the

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<sup>58</sup> The holders of airline tickets on a carrier that fails financially are likely to have larger sums at risk than are the holders of a company's telephone cards.

issuer's cards, and legislators will surely demand to know why financial regulators had not anticipated the failure and taken appropriate preventive actions. Despite these inevitable political pressures, a regulatory stance of "benign neglect" seems most appropriate at this early stage. If these instruments should subsequently assume more of the characteristics of money that call for stronger safety regulation, there will surely be opportunities for the regulatory revisiting of this issue.

7. These new electronics-based instruments may give banks and other issuers substantially enhanced capabilities for capturing quite detailed information about their users' transactions -- what, where, when, and how much. This information could be valuable for banks in their "cross-marketing" of various financial services or could be valuable as part of mailing lists sold to other marketers. It is easy to see how users (and their political representatives) could fear the potential abuse of this financial information and would insist on regulatory solutions to prevent such abuse.

In principle, a well-functioning competitive market would solve these potential problems without the need for regulatory intervention. Individual banks would establish and announce their policies with respect to the use of this information. Some banks might proudly announce, "We promise that this information will never be used, even by other subsidiaries of the bank!" Others might promise only that the information would never be sold to third parties. Yet others might acknowledge the value of the information and the possibility of its sale but also indicate that the gains would be passed through to customers through lower prices for the bank's services. Or some banks might offer a choice among these options. Bank customers would thus have a set of price-quality alternatives among which they could choose. The absence of any announced policy would likely cause the bank customers to fear the worst and to make their choices accordingly.

Nevertheless, because privacy of financial transactions is an especially sensitive subject for

many individuals and because opportunistic (or careless) behavior by some banks might arise, a modest regulatory approach does seem warranted: Banks should be required to establish and announce clearly to their customers a policy with respect to the use of the customers' transactions information. The customers can then choose among banks and policies.

8. The wider use of electronics-based instruments and procedures for the financial system will surely increase the flows of funds through EFT systems. The "wholesale" flows of funds among banks through EFT systems currently amount to hundreds of billions of dollars per day.<sup>59</sup> If a major financial institution were to fail and be unable to honor its EFT obligations in the middle of a business day, the damaging ripple effects from such a failure could be substantial.

The Federal Reserve has recently begun to charge modest interest rates for the "daylight overdrafts" (the intraday loans) that give rise to these concerns, hoping to reduce their volume. But there is a more direct way to deal with them, employing a standard tool that is already in the regulators' kitbag: capital-based limitations on the size of loan that a bank can extend to any single borrower (which thereby limits the bank's exposure to loss in the event of the failure of any borrower). These limitations should also apply to banks' exposures to loans to each other through EFT (or any other) systems. A logical extension of this requirement would be the requirement that banks meet their minimum capital requirements on a real-time (i.e., continuous) basis, not just on a periodic (e.g., end-of-quarter) basis, since banks can slip into financial difficulties at any time and not just at the end of calendar quarters.

9. Many of the new electronics-based technologies being developed for banking have

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<sup>59</sup> See, for example, Humphrey (1986, 1989).

"network" attributes,<sup>60</sup> in the sense that the innovations involve combinations of hardware and software and permit bank customers to conduct financial transactions with others, outside of the physical confines of a bank. Accordingly, issues of compatibility among transactors, so as to permit the smooth flow of transactions, and the related issues of technical standards among and between hardware and software components, are important for these innovations. Further, the value of these innovations to customers increases as the numbers of other actual or potential transactors in a system increase. And economies of scale are often important.

Industry members frequently achieve technical standards among themselves through formal or informal understandings; in essence, markets develop the standards on their own. But regulatory agencies also can be the vehicle for the achievement of technical standards, either by providing a forum and informal encouragement for industry members to reach agreements on standards among themselves or by establishing the technical standards directly through regulatory edict.<sup>61</sup>

Neither unfettered markets nor regulatory processes appear to offer an assured path to efficient and successful technological outcomes. The absence of a critical mass of users may cause promising technologies to languish in competitive markets; alternatively, a firm with a substantial market share and sales momentum may cause a "tipping" process toward an inferior technology. But there are also risks that regulatory processes may force an agreement too soon in the development process and/or the regulatory edict may settle on an inappropriate or inefficient standard.

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<sup>60</sup> Recent discussions of networks and systems can be found in Katz and Shapiro (1994), Besen and Farrell (1994), Liebowitz and Margolis (1994), Economides (1996), and White (1996e).

<sup>61</sup> The Federal Communications Commission, for example, which has been in the middle of standard-setting processes for telecommunications, has tried a variety of strategies, from completely hands-off to mandated standards. For a discussion, see Besen and Johnson (1986).

With many of the new banking technologies in nascent stages and with bank regulators unlikely to be in a better position than industry participants to choose among potential technological candidates, a regulatory stance of benign neglect again seems wisest.

## V. Conclusion

Rapid technological change and innovation is enveloping the financial sector, with beneficial consequences that are spreading throughout the U.S. economy. Because this sector is heavily regulated, there are important interactions between this rapid innovation and the financial sector's regulation.

As this paper has argued, there is an important and legitimate logic to much (but not all) financial regulation, which offers a partial explanation of why it has persisted through two decades of widespread deregulation in the U.S. economy. This financial regulation has had and will surely continue to have a role in shaping financial innovation. In turn, innovation will surely continue to pose challenges for regulation.

As the millennium approaches, a major task of public policy will be to ensure that financial regulation does not distort or stifle this rapid and beneficial innovation, while responding appropriately to the challenges that financial innovation will pose.

Appendix: A Glossary of Abbreviations

CFTC	Commodity Futures Trading Commission
CMA	Cash management account
DOJ	Department of Justice
DOL	Department of Labor
EFT	Electronic funds transfer
FASB	Financial Accounting Standards Board
FCA	Farm Credit Administration
FDIC	Federal Deposit Insurance Corporation
FHFB	Federal Housing Finance Board
FHLB	Federal Home Loan Banks
GAAP	Generally Accepted Accounting Principles
GSE	Government-sponsored enterprise
HUD	Department of Housing and Urban Development
NCUA	National Credit Union Administration
OCC	Office of the Comptroller of the Currency
OFHEO	Office of Federal Housing Enterprise Oversight
OTS	Office of Thrift Supervision
PBGC	Pension Benefit Guaranty Corporation
SEC	Securities and Exchange Commission
SIPC	Securities Investor Protection Corporation

## References

- Allen, Franklin and Douglas Gale, Financial Innovation and Risk Sharing. Cambridge, Mass.: MIT Press, 1995.
- Barfield, Claude E., International Financial Markets: Harmonization versus Competition. Washington, D.C.: American Enterprise Institute, 1996.
- Baumol, William J. and Burton G. Malkiel, "Redundant Regulation of Foreign Security Trading and U.S. Competitiveness," in Kenneth Lehn and Robert W. Kamphius, Jr., eds., Modernizing U.S. Securities Regulation: Economic and Legal Perspectives. Homewood Ill.: Business One Irwin, 1992, pp. 39-55.
- Besen Stanley M., and Leland L. Johnson, Compatibility Standards, Competition, and Innovation in the Broadcasting Industry. Washington, D.C.: Rand, 1986.
- Besen, Stanley M. and Joseph Farrell, "Choosing How to Compete: Strategies and Tactics in Standardization," Journal of Economic Perspectives, 8 (Spring 1994), pp. 117-131
- Bronfman, Corinne, Kenneth Lehn, and Robert A. Schwartz, "U.S. Securities Regulation: Regulatory Structure," in Benn Steil, ed., International Financial Market Regulation. London: Wiley, 1994, pp. 37-73.
- Brooks, John, Telephone: The First Hundred Years. New York: Harper & Row, 1975.
- Campbell, Tim S., Money and Capital Markets. Glenview, Ill.: Scott, Foresman, 1988.
- Coffee, John C., Jr., "Competition versus Consolidation: The Significance of Organizational Structure in Financial and Securities Regulation," Business Lawyer, 50 (February 1995), pp. 1-50.
- Cohen, Wesley M. and Richard C. Levin, "Empirical Studies of Innovation and Market Structure," in Richard Schmalensee and Robert Willig, eds., Handbook of Industrial Organization, Vol. 2. Amsterdam: North Holland, 1989, pp. 1059-1107.
- Demsetz, Harold, "Information and Efficiency: Another Viewpoint," Journal of Law & Economics, 12 (April 1969), pp. 1-22.
- Economides, Nicholas, "The Economics of Networks," International Journal of Industrial Organization, 14 (1996) forthcoming.
- Edwards, Franklin R. and Hugh T. Patrick, eds., Regulating International Financial Markets:

- Issues and Policies, Boston: Kluwer, 1992.
- England, Catherine, ed. Governing Banking's Future: Markets vs. Regulation. Boston: Kluwer, 1991.
- Figlewski, Stephen and Lawrence J. White, "Orange County: Don't Blame Derivatives," SternBusiness, 1 (Spring 1995), pp. 30-35.
- Finnerty, John D., "An Overview of Corporate Securities Innovation," Journal of Applied Corporate Finance, 4 (Winter 1992), pp. 23-39.
- Garbade, Kenneth G. and William L. Silber, "Technology, Communication, and the Performance of Financial Markets," Journal of Finance, 33 (June 1978), pp. 819-832.
- Gramm, Wendy L. and Gerald D. Gray, "Scams, Scoundrels, and Scapegoats: A Taxonomy of CEA Regulation over Derivative Instruments," Journal of Derivatives, 1 (Spring 1994), pp. 6-24.
- Horvitz, Paul M. and Lawrence J. White, "The Challenges of the New Electronic technologies in Banking: Private Strategies and Public Policies," presented at the Western Economic Association International meetings, June 1996a, mimeo.
- Humphrey, David B., "Payments Finality and Risk of Settlement Failure," in Anthony Saunders and Lawrence J. White, eds., Technology and the Regulation of Financial Markets: Securities, Futures, and Banking. Lexington, Mass.: Heath, 1986, pp. 97-120.
- Humphrey, David B., "Market Responses to Pricing Fedwire Daylight Overdrafts," Economic Review (Federal Reserve Bank of Richmond) 75, (May/June 1989). pp. 23-34.
- Jorion, Philippe, Big Bets Gone Bad: Derivatives and Bankruptcy in Orange County. San Diego: Academic Press, 1995.
- Joskow, Paul L. and Roger G. Noll, "Economic Regulation: Deregulation and Regulatory Reform during the 1980s," in Martin Feldstein, ed., American Economic Policy in the 1980s. Chicago: University of Chicago Press, 1994, pp. 367-440.
- Kane, Edward J., "Technology and the Regulation of Financial Markets," in Anthony Saunders and Lawrence J. White, eds., Technology and the Regulation of Financial Markets: Securities, Futures, and Banking. Lexington, Mass.: Heath, 1986, pp. 187-194.
- Kane, Edward J., "Tension between Competition and Coordination in International Financial Regulation," in Catherine England, ed., Governing Banking's Future: Markets vs. Regulation. Boston: Kluwer, 1991, pp. 33-48.

- Katz, Michael L. and Carl Shapiro, "Systems Competition and Network Effects," Journal of Economic Perspectives, 8 (Spring 1994), pp. 93-115.
- Kopke, Richard W., "Financial Innovation and Standards for the Capital of Life Insurance Companies," New England Economic Review (January/February 1995), pp. 29-57.
- Kopke, Richard W. and Richard E. Randall, eds., The Financial Condition and Regulation of Insurance Companies. Conference Series No. 35, Federal Reserve Bank of Boston, June 1991.
- Krueger, Anne O., "The Political Economy of the Rent-Seeking Society," American Economic Review, 66 (June 1974), pp. 291-303.
- Lea, Michael J., "Innovation and the Cost of Credit: A Historical Perspective," Housing Policy Debate, 7, No. 1 (1996), pp. 147-174.
- Liebowitz, S.J., and Stephen E. Margolis, "Network Externality: An Uncommon Tragedy," Journal of Economics Perspectives, 8 (Spring 1994), pp. 133-150.
- Litan, Robert E., What Should Banks Do? Washington, D.C.: Brookings Institution, 1987.
- Mann, H. Michael, "The New York Stock Exchange: A cartel at the End of Its Reign," in Almarin Phillips, ed., Promoting Competition in Regulated Markets. Washington, D.C.: Brookings, 1975, pp. 301-327.
- Merton, Robert C., "Financial Innovation and Economic Performance," Journal of Applied Corporate Finance, 4 (Winter 1992), pp. 12-22.
- Miller, Merton H., "Financial Innovation: The Last Twenty Years and the Next," Journal of Financial and Quantitative Analysis, 21 (December 1986), pp. 459-471.
- Miller, Merton H., "Financial Innovation: Achievements and Prospects," Journal of Applied Corporate Finance, 4 (Winter 1992), pp. 4-12.
- Noll, Roger G., "Economic Perspectives on the Politics of Regulation," in Richard Schmalensee and Robert D. Willig, eds., Handbook of Industrial Organization, vol. 2. Amsterdam: North Holland, 1989, pp. 1253-1287.
- Ofer, A.R. and Ari Melnik, "Price Deregulation in the Brokerage Industry: An Empirical Analysis," Bell Journal of Economics and Management Science, 9 (Autumn 1978), pp. 633-641.
- Peltzman, Sam, "Toward a More General Theory of Regulation," Journal of Law & Economics, 19 (August 1976), 211-40.

Posner, Richard A., "Taxation by Regulation," Bell Journal of Economics and Management Science, 2 (Spring 1971), pp. 22-50.

Posner, Richard A., "Theories of Economic Regulation," Bell Journal of Economics and Management Science, 5 (Autumn 1974), pp. 335-358.

Roberts, Dan, Susan M. Phillips, and J. Richard Zecher, "Deregulation of Fixed Commission Rates in the Securities Industry," in Lawrence G. Goldberg and Lawrence J. White, eds., The Deregulation of the Banking and Securities Industries. Lexington, Mass.: Heath, 1979, pp. 151-183.

Saunders, Anthony and Lawrence J. White, eds., Technology and the Regulation of Financial Markets: Securities, Futures, and Banking. Lexington, Mass.: Heath, 1986.

Scherer, F.M. and David Ross, Industrial Market Structure and Economic Performance. 3rd ed. Boston: Houghton-Mifflin, 1990.

Scott, Kenneth E., "The Dual Banking System: A Model of Competition in Regulation," Stanford Law Review, 30 (1977), pp. 1-50.

Schwert, William G., "Public Regulation of National Securities Exchanges: A Test of the Capture Hypothesis," Bell Journal of Economics and Management Science, 8 (Spring 1977), pp. 128-150.

Siegel, Daniel R., ed., Innovation and Technology in the Markets: A Reordering of the World's Capital Market System. Chicago: Probus, 1990.

Stansell, Stanley R., ed., International Financial Market Integration. Cambridge, Mass.: Blackwell, 1993.

- Stigler, George, J., "The Theory of Regulation," Bell Journal of Economics and Management Science, 2 (Spring 1971), pp. 3-21.
- Tinic, Seha M. and Richard R. West, "The Securities Industry under Negotiated Brokerage Commissions: Changes in the Structure and Performance of New York Stock Exchange Member Firms," Bell Journal of Economics and Management Science, 11 (Spring 1980), pp. 29-41.
- Van Horne, James C., "Of Financial Innovations and Excesses," Journal of Finance, 40 (July 1985), pp. 621-636.
- White, Lawrence J. "The Partial Deregulation of Banks and Other Depository Institutions," in Leonard W. Weiss and Michael W. Klass, eds. Regulatory Reform: What Actually Happened. Boston: Little, Brown, 1986, pp. 169-204.
- White, Lawrence J., The S&L Debacle: Public Policy Lessons for Bank and Thrift Regulation. New York: Oxford University Press, 1991.
- White, Lawrence J., "The Community Reinvestment Act: Good Intentions Headed in the Wrong Direction," Fordham Urban Law Journal, 20 (Winter 1993), pp. 281-292.
- White, Lawrence J., "On the Internationalization of Bank Regulation," Oxford Review of Economic Policy, 10 (Winter 1994), pp. 94-105.
- White, Lawrence J., "Tying, Banking, and Antitrust: It's Time for a Change," Contemporary Policy Issues, October 1995.
- White, Lawrence J., "Technological Innovation and the Regulation of the Financial Services Sector: Tensions and Interactions," prepared for the "Technology and Finance" ~~Discussion~~ Series of the New York Academy of Sciences, March 1996a, mimeo.
- White, Lawrence J., "International Regulation of Securities Markets: Competition or Harmonization?" in A. Lo (ed.), The Industrial Organization and Regulation of Securities Markets, Chicago, University of Chicago Press, 1996b.
- White, Lawrence J., "Competition versus Harmonization: An Overview of International ~~Regulation~~ of Financial Services," in Claude Barfield, ed., International Trade in Financial Services. Washington: American Enterprise Institute, 1996c.
- White, Lawrence J., "The NAIC Model Investment Law: A Missed Opportunity," in Edward I. Altman and Irwin T. Vanderhoof, eds., The Strategic Dynamics of the Insurance Industry: Asset/Liability Management Issues. Burr Ridge, Il.: Irwin, 1996d.
- White, Lawrence J., "U.S. Public Policy Toward Network Industries," in Robert Hahn, ed.,

Reviving Regulatory Reform. Washington, D.C.: American Enterprise Institute, 1996e.

Winston, Clifford, "Economic Deregulation: Days of Reckoning for Microeconomists," Journal of Economic Literature 31, (September 1993), pp. 1263-1289.

Wolf, Charles, Jr. (1989), Markets or Governments: Choosing Between Imperfect Alternatives, Cambridge, Mass.: MIT Press.