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Market Economies*

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Commodity Prices, the Term Structure of Interest Rates, and Exchange Rates: Useful Indicators for Monetary Policy?

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Unlike the American Revolution, which started with cries of “no taxation without representation,” the overthrow of political and economic systems in Central and Eastern Europe did not have taxes at its forefront. Under socialism, taxes had been invisible to much of the population. They were part of an elaborate framework of central planning, rather than a separate, distinguishable element in the lives of typical citizens.

This article examines how tax structures have fared in the context of broader changes in Central and Eastern Europe. It investigates the extent to which these tax systems continue to reflect a legacy of socialism, as opposed to resembling those in the United States and other market economies. The author concludes that tax reform appears to be an evolutionary process, largely mimicking broader economic reforms. Even where changes have taken place in economic and tax policies, however, reform of tax administration remains a significant challenge. 3

Effective conduct of monetary policy requires accurate and timely indications of the current and future course of the ultimate targets of monetary policy. It is widely agreed that the monetary aggregates no longer provide reliable signals of inflation or of real activity. It is less widely agreed which variable or variables should replace the aggregates, or how they would be used in conducting monetary policy.

This article considers whether the slope of the term structure of interest rates, commodity prices, and the exchange rate could be suitable replacements for the aggregates. The author finds that on both theoretical and empirical grounds, the proposed indicators would be neither straightforward nor reliable guides to monetary policy. On theoretical grounds, the indicators would be difficult to interpret because the sign and magnitude of their correlations with ultimate targets depend critically upon the monetary policy regime in effect. Empirically, the study finds that no single indicator bears a stable and statistically reliable relationship to the current or future course of a monetary policy target. 18

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Business Failures in New England

*James W. Meehan, Jr., Joe Peek,
and Eric S. Rosengren*

During the 1980s, the New England economy prospered relative to the nation as a whole, with lower unemployment rates, more rapidly rising real estate prices, and lower rates of business failures. As the economic tide turned against New England at the end of the decade, the rate of business failures soared, in absolute terms as well as relative to nationwide statistics. This recent wave of business failures appears to have been far in excess of that attributable to the decline in New England economic activity. Moreover, it has undesirable implications for the regional economy and can be expected to slow economic recovery in the area.

The authors explore several explanations for the increase in business failures, including employment losses, industry mix effects, and credit availability. Their findings suggest that difficulties in the banking sector have contributed significantly to the very high rate of business failures in New England. 33

Input Tariffs as a Way to Deal with Dumping

Susan E. Skeath

The General Agreement on Tariffs and Trade (GATT) has significantly reduced the use of tariffs as barriers to international trade in today's marketplace. The existence of antidumping legislation, however, provides American industry with a method of procuring protection when the pressures of international competition become oppressive. Many American companies have taken advantage of the legislation and claimed injury at the hands of unfair competition from abroad, often winning the imposition of punitive duties on competing imports as compensation for previous underpricing.

This article uses an analytical model to explore in detail an intriguing antidumping case, initiated in mid-1990, involving flat-panel display screens for laptop computers. The vertical relationships between laptop screen and laptop computer producers make the results of the analysis applicable to a wide variety of international industries with vertically integrated or vertically related firms. 45

Tax Reform in Newly Emerging Market Economies

Yolanda K. Kodrzycki

Economist, Federal Reserve Bank of Boston. This article reflects the author's experience as Senior Advisor, U.S. Treasury Department Tax Advisory Programs for Central and Eastern Europe and the former Soviet Union, 1991–92, and her continuing involvement in providing technical assistance to the Government of Poland on behalf of the U.S. Treasury Department. However, the views expressed in this article do not necessarily represent those of the U.S. Treasury Department. The author's acknowledgments appear at the end of the article.

Unlike the American Revolution, which started with cries of “no taxation without representation,” the overthrow of political and economic systems in Central and Eastern Europe did not have taxes at its forefront. Under socialism, taxes had been invisible to much of the population. They were part of an elaborate framework of central planning, rather than a separate, distinguishable element in the lives of typical citizens.

This article examines how tax structures have fared in the context of broader changes in Central and Eastern Europe. It investigates the extent to which these tax systems continue to reflect a legacy of socialism, as opposed to resembling those in the United States and other market economies.

Section I outlines the fundamental differences between taxation in a socialist and a market-oriented economy. Recent worldwide themes in tax reform heightened these distinctions and are summarized in Section II. Section III describes the very sizable tax changes that have occurred in Hungary and Poland, and provides a brief overview of reform efforts in other formerly socialist countries in Central and Eastern Europe. Section IV presents the article's conclusions. Tax reform appears to be an evolutionary process, largely mimicking broader economic reforms. Even where changes have taken place in economic and tax policies, however, reform of tax administration remains a significant challenge. The formerly socialist countries must address how to monitor tax collections from a greatly expanded number of entities that are covered under the reformed tax laws. The tax authorities must find the right balance between acknowledging the expanded economic freedom arising from capitalism on the one hand, and enforcing the private sector's responsibility to pay the taxes it owes on the other.

Table 1

Government Revenues as a Percent of Gross Domestic Product, 1988 or 1989

	Total Revenues	Total Tax Revenues	Profit or Corporate Income Tax	Personal Income Tax	Taxes on Goods and Services	Social Security Contributions	All Other Taxes
			11				
Albania	n.a.	44			23	5	6
Bulgaria	57	49	23	4	11	10	1
Czech and Slovak Federal Republic	60	55	15	6	18	15	1
Hungary	61	49	7	6	18	14	5
Poland	47	37	10	3	9	9	6
Romania	53	42	11	7	15	9	1
USSR	46	39	12	5	12	4	6
Yugoslavia	41	35	6	10	5	9	5
Averages							
Socialist countries ^a	52	44	12	6	14	9	4
OECD	n.a.	38	3	12	12	10	2
European Community	44	41	3	11	13	12	2

^aExcluding Albania in cases of missing data.

n.a. indicates data are not available from the sources used.

Source: Total revenues from Kopits (1991). Tax revenues from Blejer and others (1992), OECD (1990, 1991a, 1992), and author's calculations.

I. The Legacy of Socialism

In both market-oriented and socialist economies, the primary goal of taxation is to raise enough revenue to fund government expenditures. But in a socialist economy, the tax system also reflects the government's role as the setter of prices and the predominant owner of capital. The administration of the tax system takes advantage of the concentration of economic activity. To the extent that private enterprise exists, it is taxed under separate rules. Outside of socialist countries, by contrast, market forces rather than taxes are the primary determinant of the allocation of resources among sectors of the economy. If governments apply different tax rates to different activities, they are under some obligation to justify these choices by indicating how the market fails to achieve a socially desirable outcome. Finally, in a market-based economy, the tax authorities rely on "self-assessment" by taxpayers—that is, calculation of their obligations without direct supervision, and only selective audits, by government.

Central Planning

Government plays a more interventionist role in socialist than in market-oriented economies. Not sur-

prisingly, then, at the outset of their transition to a market economy, the socialist countries of Europe generally allocated a higher share of national income to government than was the case in market-oriented developed nations. Government revenues averaged 52 percent of GDP in Bulgaria, Czechoslovakia, Hungary, Poland, Romania, the Soviet Union, and Yugoslavia in the late 1980s (Table 1). This compared with 44 percent in the European Community at that time.

But the degree of government intervention is not adequately captured by such a simple ratio.¹ For one thing, the average share of taxes in the socialist countries understates the role of the state because of "off budget" activities. State-owned enterprises provided basic health care, recreational facilities, and in

¹ In addition to the points raised in the text about the measurement of government's role, it should be noted that Table 1 is derived from countries' own estimates of taxes and GDP. Countries may differ as to whether social security contributions and customs duties are considered taxes. Some functions may be assigned to local authorities financed by a mix of government taxes and independent nontax revenues. The measurement of GDP is subject to considerable uncertainty in socialist countries. Traditionally, these countries concentrated their data collection on the tabulation of net material product, a concept that does not take into account many of the services included in GDP. Also, the market values of a variety of goods and services were masked by price controls and quantity restrictions.

some cases housing to their workers. In addition, they often financed the construction of infrastructure for public utilities. Nor does it appear from the data in Table 1 that "bigger" governments necessarily claimed a larger share of national income. Hungary, for example, began a gradual retreat from central planning in the late 1960s, yet its ratio of government revenues to GDP (61 percent) is the highest among the countries shown. By contrast, the Soviet Union, where socialism was the most entrenched, comes out with the second lowest ratio of government to GDP (46 percent).

In addition to raising revenue, the tax system in a socialist economy reflected the government's role as the setter of prices and the predominant owner of capital.

Intervention is also indicated by the degree to which government sets revenue burdens and subsidies that vary by type of economic activity. Under socialism, industry-specific turnover taxes were used to control profit margins.² For example, suppose a manufacturer purchased inputs at 100 currency units and was allowed to sell output at 200. If the planning authorities decided to limit the manufacturer's gross margin to 40, they would impose a turnover tax of 60. The turnover tax rate (in this case, 30 percent—60 divided by 200) would be determined as the outcome of planners' calculations of the target profit margin for the business. This margin, in turn, would determine the enterprise's budget for remunerating workers, buying capital goods, and undertaking other business expenditures. In other words, it would affect the resources channeled to each type of production.

Socialist countries in Central and Eastern Europe had hundreds or even thousands of turnover tax rates. In market-based economies, by contrast, tax rates are set independently and reflect overall revenue requirements. To the extent possible, the framers of the latter systems seek neutrality, in the sense of not taxing sales of different goods and services, or profits of different types of companies, at different rates. Tax rates are just one of the factors influencing profit margins for individual companies. As noted in

section III below, one measure of Hungary's progress toward a market economy is that it had drastically reduced the number of turnover tax rates by the mid 1980s.

Public Ownership

In an economic system where a considerable amount of property is publicly owned, the government has a variety of options for collecting revenues. In addition to imposing taxes, it may charge "rents" or "interest" for the use of state-owned property, or it may collect "dividends" from state-owned enterprises. The socialist countries of Central and Eastern Europe, on average, were collecting 8 percent of GDP in nontax revenues, more than double the share for market-oriented countries. (Compare "total revenues" and "total tax revenues" columns in Table 1.)

Furthermore, because under socialism both business taxpayers and the tax administration answered to the government, taxes and nontax levies could be more arbitrary than in a market economy. If central planners decided that greater revenues were needed, they could raise taxes or fees retroactively by issuing the necessary instructions to tax administrators. State-owned enterprises were unlikely to complain (as private companies might) that the government had violated a social contract—or that they had based their business decisions on the wrong signals. In fact, tax policy changed very frequently, and tax payments often were negotiated between state-owned enterprises and the tax authorities. As a result, payments were not well predicted by what appeared in formal tax laws.

It was not important for taxpayers in socialist countries to understand the tax system. Tax payments typically were based not on the taxpayer's own assessment of tax liability given a set of rules, but on the judgment of the tax collector. Simplicity was not needed, either in the design of tax policy or in the design of tax forms.

Concentration of Production

The relative importance of business and personal income taxes differed considerably between the socialist and the market-oriented countries. On average, the Central and Eastern European socialist coun-

² Turnover taxes are a form of sales tax. Usually they are levied at intermediate stages of production, such as manufacturing and wholesaling.

tries were four times as reliant on taxes from business enterprise profits as the OECD or Western European countries, and only half as dependent on personal income taxes (Table 1). Moreover, in most socialist countries, many individuals were totally unaware of income taxes, as these taxes were paid by their employers. Workers were quoted a wage rate that was net of taxes. Government authorities did not receive documentation of which workers' wages were taxed, as they do in market-oriented countries that use payroll taxes to finance social insurance programs. In Poland, for example, only an estimated 1 to 2 percent of government revenues consisted of taxes collected directly from individuals (Bolkowiak and Relewicz 1991).

Socialist countries had many fewer taxpayers than comparably sized market-oriented countries. Not only were many individuals not responsible for making tax payments, but also most production was carried out by large state-owned enterprises. For example, prior to the recent reforms, two-thirds of industrial workers in Hungary were employed in enterprises with over 240 workers; in capitalist industrialized countries, the share is typically well under 10 percent. Poland's employment was even more concentrated than Hungary's, as two-thirds of its industrial work force was employed at enterprises with over 1,000 workers (OECD 1992).

The existence of relatively few taxpayers meant that tax administrators could readily use manual procedures to record tax collections. Also, the government was able to check up on the overwhelming share of total tax payments as part of its annual audits of the economic performance of state-owned enterprises.

Separate Rules Governing Private Sector Activity

To the extent that private activity existed, socialist countries tended to discourage it actively by imposing very high income tax rates. The more objectionable the activity, the higher the tax rate. For example, Bulgaria had a general personal income tax rate of 14 percent, a 50 percent tax rate for artists and scholars, and an 85 percent tax rate for private entrepreneurs. By contrast, income tax schedules in OECD countries do not distinguish between occupations or between employment in the private versus the public sector. Also, as discussed in the next section, top marginal rates are generally lower than those that existed under socialism.

Finally, some types of private ownership of capital were (practically) nonexistent in socialist coun-

tries, so the tax laws were silent on certain forms of income. For example, citizens did not accumulate financial wealth by owning stocks and bonds of private corporations (or, for that matter, of government or state-owned enterprises). Therefore tax codes did not have to address issues related to dividends, interest, and capital gains from such sources. Individuals could accumulate wealth in savings accounts at state-owned financial institutions, but the revenue requirements of the government were addressed through implicit taxation—that is, control of interest rates.³

II. Tax Reform in Market-Oriented Countries

In order to assess how closely tax systems in Central and Eastern Europe now resemble those in other countries, it is necessary to take account of the worldwide tax reform movement of the 1980s. Throughout the capitalist industrialized world, countries explicitly sought to lower the influence of taxation on economic decisions. By lowering marginal income tax rates, they permitted workers and businesses to earn a wage or rate of return that was closer to the true economic value of their production. By introducing greater similarity of tax rates across different goods and services, they allowed consumers' buying decisions to be based on less distorted market prices. This visible attempt to achieve greater tax neutrality served to heighten the distinction between socialist and capitalist tax frameworks at the time that Central and Eastern European countries started their reforms.

The dominant theme in worldwide income tax reform was lower personal and corporate tax rates, combined with a broader tax base. During the 1980s, almost all countries in the OECD lowered their top rates of individual income tax (Table 2). In over half of the OECD countries, the new top rate was at least 10 points lower than had existed prior to the reforms. The majority of countries also lowered their rates of corporate income tax. Top personal income tax rates now typically lie in the range of 30 to 50 percent, and top corporate rates between 35 and 45 percent.

Despite the lowering of tax rates, income tax revenues remained roughly constant as a fraction of

³ Implicit taxation is another reason why the data in Table 1 do not capture the full extent of government intervention in the economy.

Table 2
Top Central Government Marginal Income Tax Rates in OECD Member Countries, 1990

Country	Personal Income		Corporate Income	
	Top Tax Rate after Reform (Percent)	Reduction from Reform ^a (Percentage Points)	Top Tax Rate after Reform (Percent)	Reduction from Reform ^b (Percentage Points)
Australia	47	10	39	10
Austria	50	12	30	n.a.
Belgium	55	17	41	2
Canada	29	5	25	21
Denmark	40	5	40	10
Finland	43	8	33	0
France	57	8	37	13
Germany	53	3	50	6
Greece	50	13	46	n.a.
Iceland	33	5	50	n.a.
Ireland	53	5	43	7
Italy	50	12	36	10
Japan	50	20	37.5	5.5
Luxembourg	56	1	34	2
Netherlands	60	12	35	7
New Zealand	33	24	28	20
Norway	20	20	27.8	0
Portugal	^c	^c	36.5	1.5
Spain	56	10	35	0
Sweden	20 ^d	30	40	12
Switzerland	13	0	3.6–9.8	0
Turkey	50	0	46	0
United Kingdom	40	20	35	15
United States	28 ^e	22 ^e	34	12

^aBased on comparison with 1986 top tax rate.

^bBased on comparison with 1984 top tax rate; Australia, Belgium, Denmark, Finland, Ireland, Luxembourg, New Zealand, Norway, Portugal, Spain, Switzerland, Turkey compared with 1988.

^cComparison not possible because of a reform in the structure of personal income taxation.

^d1991 data.

^eThe top rate in 1980 was 70 percent, for a 1980–90 reduction of 42 points. Since 1990, the top rate has been increased to 39.6 percent.

Note: n.a. = no information available in sources used.

Source: Personal income tax rates, OECD (1991a). Corporate income tax rates, OECD (1991a), Pechman (1987), Price Waterhouse (1988).

GDP. Income tax bases were broadened and tax credits were scaled back to compensate for the lower rates. For example, the U.S. tax reform in 1986 eliminated the partial exemption of capital gains income, disallowed the deductibility of some state and local taxes, ended the investment tax credit, slowed depreciation of buildings, and introduced a host of other provisions designed to keep total personal plus corporate income tax revenues unchanged as rates were reduced.

Lower income tax rates and a broader base were introduced in order to make the tax system more neutral with respect to economic decisions. Greater neutrality was thought to promote higher output in the long run, as compared with a system in which

certain activities are taxed preferentially. For example, if some businesses qualify for lower taxation as a result of eligibility for higher depreciation deductions, they will tend to expand at the expense of other businesses that might be more productive, but that are at a financial disadvantage as a result of ineligibility for tax preferences. If, on the other hand, the tax system is neutral, businesses with higher productivity will have greater relative possibilities for expansion. In some countries, an unindexed income tax code had interacted with high inflation to result in disparate taxation of different types of business activity and general discouragement of work and saving. Also, the availability of tax preferences for certain activities and not others had led to a perception of

Table 3
*Value-Added Tax Rates in OECD
 Member Countries*

Country	Standard Rate	Number of Rates ^a	Date of Introduction of VAT
Australia	No VAT		
Austria	20	3	1973
Belgium	19	6	1971
Canada	7	1	1991
Denmark	22	1	1967
Finland	17	1	1990
France	18.6	5	1968
Germany	14	2	1968
Greece	18	4	1987
Iceland	24.5	2	1990
Ireland	21	4	1972
Italy	19	4	1976
Japan	3	2	1989
Luxembourg	12	3	1970
Netherlands	18.5	2	1969
New Zealand	12.5	1	1986
Norway	20	2	1970
Portugal	17	3	1986
Spain	12	3	1986
Sweden	25	1	1969
Switzerland	No VAT		
Turkey	12	5	1985
United Kingdom	17.5	1	1973
United States	No VAT		

^aExcluding zero rate.

Note: Data reflect most recent information available to the International Monetary Fund at the time the report was prepared.

Source: Tait (1991).

unfairness, as well as potential distortions in the allocation of resources among activities.

With regard to indirect taxation, the most prevalent theme was the substitution of a value-added tax (VAT) for pre-existing turnover or sales taxes. Twelve countries in the OECD already had a VAT at the beginning of the 1980s (Table 3). But VATs have since been introduced in nine others—Canada, Finland, Greece, Iceland, Japan, New Zealand, Portugal, Spain, and Turkey. This leaves only three OECD countries—including the United States—without a value-added tax.

As with income tax reforms, one reason for introducing a value-added tax has been to promote neutrality. For example, if turnover or sales taxes are imposed at several levels of production, final products may effectively be taxed quite differently, depending upon how many companies are involved in

their manufacture and distribution.⁴ This problem does not arise under a value-added tax, since each company receives a credit for the tax paid by suppliers. Also, many traditional consumption taxes applied only to goods but not to services, or were levied at different rates for different sectors of the economy. The shift from a turnover or sales tax to a value-added tax has sometimes been a convenient point for broadening the tax base and imposing more uniform rates.⁵

Another reason for introducing a value-added tax was that it provides neutral treatment for domestically produced and imported goods. Exporters pay a zero rate on their production, while a VAT is paid upon importation of goods or services. The result of this policy is that taxes depend on where goods are consumed, not where they are produced.⁶

In an effort to harmonize tax structures as part of a move toward greater economic unity, the European Community has recommended that its members have no more than two or three rates of value-added tax, with lower rates limited to basic necessities. The standard rate is to be not less than 15 percent and the reduced rate(s) not less than 5 percent. Seven of the twelve members of the European Community cur-

⁴ For example, suppose manufacturers and wholesalers are subject to sales taxes. If a product is sold by a manufacturer to a wholesaler, and then by the wholesaler to a retailer, the price charged to the retail customer is likely to reflect the two levels of tax. On the other hand, if the manufacturer and the wholesaler merged, the sales tax would be charged only once, resulting in some potential price reduction for the ultimate consumer.

⁵ For example, consider Canada and Japan, two countries that recently adopted a VAT. In Canada, the preexisting manufacturers' sales tax was collected on a base that included only about one-third of total consumption. Rates varied across products. Capital was taxed heavily, as capital goods were included in the tax base and the value added by capital was captured in the tax base of using industries. Now Canada has a single-rate VAT applying to a broad range of goods and services. Japan used to levy a retail sales tax on some goods (10 percent for carpets and 15 percent for all other goods subject to the retail tax) and a wholesale tax on other goods (at rates ranging from 5 percent for coffee to 30 percent for certain luxuries). Now Japan has two rates of value-added tax. See Pechman (1987), Boskin and McLure (1990), and Table 3.

⁶ For example, suppose country A imports raw materials valued at 100 currency units from country B. The importing company would be liable for value-added tax at country A's rate, say 10 percent. Suppose the company processed the raw materials further and sold the finished product for 300. It would pay a VAT of 30, but would receive a credit of 10. The total value-added tax paid upon importation and upon final sale, 30, would be identical to what would be paid if the company had purchased the raw materials domestically (assuming identical prices). In that case, the domestic supplier would pay a VAT of 10, and the processing company would still pay a VAT of 30 but receive a credit of 10. This example assumes that country B in effect levies no value-added or other sales tax on exports that might be incorporated into its selling price to country A.

Table 4
Basic Features of Taxation in Hungary and Poland

	Hungary	Poland
Personal Income Tax	Tax brackets of 25, 35, and 40 percent. Zero bracket covers income up to 100,000 forints (approximately \$1,050 at current exchange rate). Top bracket starts at 500,000 forints (approximately \$5,250). Flat tax rate of 20 percent on interest, 10 percent on dividends.	Tax brackets of 20, 30, and 40 percent. Personal exemption of 864,000 zloty (approximately \$45 at current exchange rate). Top bracket starts at 129.6 million zloty (approximately \$7,200). Flat tax rate of 20 percent on interest and dividends.
Enterprise Income Tax	Tax rate of 40 percent; 35 percent for small enterprises. Five-year carryforward of net operating losses. Straight-line depreciation.	Tax rate of 40 percent. Three-year carryforward of net operating losses. Straight-line depreciation; periodic revaluation of basis.
Value-Added Tax	Zero tax rate for pharmaceuticals. 10-percent rate for basic foods, some agricultural inputs, household energy, health care products, and books. 25-percent rate for most other goods and services. Some products also subject to excises.	7-percent rate for agricultural products (except certain meat, egg, and milk products, which are exempt from tax), agricultural machinery, pharmaceuticals and health care products, newspapers, basic transportation services, and hotel services (except luxury hotels). 23-percent rate for most other goods and services. Rate for building materials, fuels, and energy temporarily reduced to 7 percent. Some products also subject to excises.

Source: Andersson (1992); "Capitalism Already? A Variety of Hungarian Taxes" (1992); Dziennik Ustaw (1993); Kozłowska and Radzewicz (1991); Lukács (1991); OECD (1991a); Ożóg (1992); and country sources.

rently have three or fewer VAT rates.⁷ Foods, pharmaceuticals, and books and newspapers are the items most often receiving preferential tax treatment (OECD 1991a).

III. Tax Reform in Central and Eastern Europe

The timing of tax reform in Central and Eastern Europe has reflected the pace of economic reforms. Countries where privatization is taking place need to develop tax structures that are conducive to growth of private sector activity. Unless their tax structures expand to encompass private activity, however, revenues will fall sharply as the state-owned business sector shrinks—both as a direct result of privatization and because of the declining profitability of state-owned enterprises in the face of competition.

Among the countries in this region, Hungary and Poland have made the most progress toward both tax and economic reforms. According to researchers at the Polish Institute of Finance, by the late 1980s "the tax system, introduced in the framework of a centrally planned economy, and characteristic of

socialist realities, had already turned into a very tight 'corset'" in both Hungary and Poland (Bolkowski and Relewicz 1991). The Czech and Slovak Republics have recently caught up in terms of tax policy changes, after being delayed by discussions of their political relationship.⁸ This section describes tax reform efforts in Hungary and Poland (with their current tax structures summarized in Table 4). It then reports briefly on the status of tax reform in the remaining countries of the region.

Hungary

Hungary first started to retreat from central planning in 1968 by providing more autonomy for individual enterprises. Economic reforms took place gradually, so that in the early 1980s the economy was still dominated by about 6,000 large enterprises and quasi-state agricultural cooperatives (Kornai 1992). Hungary took a series of steps in the 1980s to relax

⁷ The exceptions are Belgium, France, Greece, Ireland, and Italy (Table 3).

⁸ On January 1, 1993, Czechoslovakia split into two independent countries, the Czech Republic and Slovakia.

restrictions on private business activity. In 1989–90, the Communist Party monopoly came to an end, and free elections were held, thereby ushering in further liberalization of the economy. By 1991, the tax authorities were aware of over 100,000 economic entities (Kornai 1992).

Hungary has gone through a maturation process with respect to tax policy. Early attempts to attract foreign investors emphasized tax breaks. More recently, the tax system has evolved to become more similar to what OECD residents might find in their home countries—thereby signaling Hungary's desire to become an integral part of the economically advanced world.

Enterprise profits taxes. Hungary is well known among the other countries in Central and Eastern Europe for its policy of allowing generous tax breaks to encourage joint ventures with foreign companies.⁹ Hungary began to allow joint ventures with foreigners in 1972. At that time, taxation of domestic businesses—primarily state-owned enterprises—was complex and arbitrary. The overall tax burden on businesses was estimated to be considerably higher than in capitalist countries. The Hungarian authorities decided explicitly to grant preferential tax treatment to foreign direct investments as a means of encouraging economic development. In order to provide foreign companies with a clear indication of their tax obligations, legislation was passed to bar the practice, commonly applied to domestic companies, of introducing new levies during the course of a tax year.

Over time, tax concessions for foreign joint ventures became increasingly generous and the rules were formalized rather than being applied ad hoc. By the late 1980s, three tiers of tax treatment had developed. All foreign ventures enjoyed at least a 20 percent reduction in their effective tax rate, compared with what the law specified for domestic companies. Manufacturing ventures of a certain size and degree of foreign participation were allowed a 60 percent tax reduction over the first five years of their existence, followed by a 40 percent tax reduction in each subsequent year. Companies in industries considered to be of special importance enjoyed a tax holiday for five years, followed by a 60 percent tax reduction from what domestic tax laws specified.

With the acceleration of economic and political changes in the late 1980s, Hungary began to create new opportunities for domestic investment. In 1989, the enterprise income tax was overhauled, and the top rate reduced to 50 percent. The following year, the tax rate was reduced further, to 40 percent. The

Budapest stock market was re-established in 1989. The State Property Agency was established in 1990 to oversee privatization. It organized weekly auctions of small businesses and individual offerings of larger businesses. Consistent with the policy of encouraging indigenous capitalism, the government cut back preferences for foreign direct investment. As of 1990, the general 20 percent tax break was eliminated, and remaining tax reliefs were restricted to a period not to exceed 10 years. The special provisions for foreign investment are due to disappear entirely for ventures established after 1993.

With the gradual reductions in the top statutory tax rate, along with the scaling back of tax preferences for foreign-owned ventures, Hungary's system of taxing business income has become quite similar to tax systems in other industrialized countries. Some analysts continue to regard the effective taxation of business profits as high, however, especially given stringent provisions for depreciation allowances (Andersson 1992).¹⁰

Taxation of goods and services. Reform of taxes on goods and services began in 1968, but according to the account of an official of the Hungarian Ministry of Finance, "it took more than 15 years to transform the original turnover tax system using about three thousand rates into a four-rate system, with similar and substitute products classified under the same respective rates" (Lukács 1991, p. 221).

In 1988, Hungary replaced its turnover tax with a value-added tax. Most basic goods, including food, were zero-rated under the VAT, while other products were taxed at a 25 percent rate. Services were either tax-exempt or taxed at a 15 percent rate. (A producer of an item that is zero-rated pays no tax on sales, but is allowed the standard credit for value-added tax paid by suppliers of inputs. By contrast, a tax exemption means that the business has neither tax liabilities nor tax credits.¹¹)

⁹ For an especially good overview of the historical influences on Hungary's policy toward foreign direct investment, see Répásky (1991).

¹⁰ Andersson also noted that Hungary has a relatively restrictive policy regarding loss carryforwards. However, losses may now generally be carried forward five years, which is not unlike OECD rules. More liberal rules exist for start-up companies.

¹¹ Governments choose zero rating when they wish to provide favorable tax treatment for particular goods or services. By contrast, they choose tax exemptions largely for administrative reasons—to limit the overall number of taxpayers or to exclude taxpayers from whom it is deemed difficult to collect the tax. For example, VATs typically have an exemption for businesses below a specified size. Tax-exempt businesses may still bear some tax burden, however, to the extent they purchase inputs whose price reflects the VAT.

The overall coverage of the zero tax rate was unusually high—over 40 percent of total measured consumption. Necessities form a large fraction of the budget of Hungarian consumers. In addition, the policy of not taxing food is rare. Among OECD countries, only the United Kingdom, Ireland, and Portugal specify a zero rate for all or most food products.

In order to increase revenues, the Hungarian government recently eliminated the zero tax rate, except for pharmaceuticals (and exports, as is standard under the VAT). Domestically consumed goods and services are taxed at 10 percent or 25 percent. This new structure still leaves Hungary's top tax rate high by European standards (see Table 3). Thus, further reform might be called for before Hungary obtains full membership in the European Community.¹²

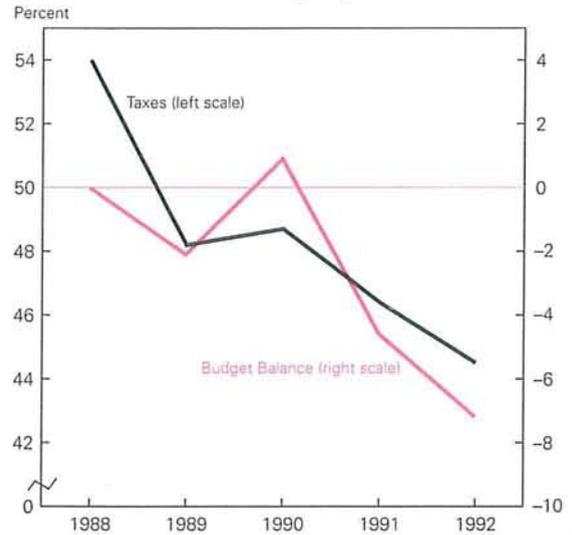
Personal income and wage taxes. A broad-based personal income tax was introduced in Hungary in 1988. The rate structure is progressive, but over time, marginal income tax rates have been lowered. The top rate was 60 percent at inception, 56 percent in 1989, 50 percent in 1990 and 1991, and is now 40 percent—in the middle of the range for the OECD countries. Faced with budgetary problems, however, the government is considering raising the marginal tax rate somewhat.

Taxes to fund social insurance benefits are quite high. The combined employer-employee tax for funding retirement and disability payments is 54 percent of gross wages. An additional 6 percent payroll tax was introduced in 1991 to finance unemployment benefits. These high tax rates largely reflect the fact that average wages are not as high relative to minimum acceptable incomes as they are in wealthier countries. Also, retirees have not accumulated much private savings; therefore, virtually all of their consumption must be supported by public pensions.

Tax revenues and tax administration. During the transition to a market economy, tax revenues in Hungary have fallen as a fraction of GDP—by about 9 percentage points since 1988. This result appears to be largely unintentional, as it has contributed to a rising government budget deficit (Figure 1). According to the International Monetary Fund (1993), a substantial part of the drop-off in tax revenues is due to the inability of the tax administration to collect profits taxes from the growing private sector, at the same time that profits of traditional taxpayers—state-owned enterprises—have plummeted. Also, each round of tax reform appears to have been accompanied by temporary problems in implementation. All

Figure 1

Taxes and Government Budget Balance as a Percentage of GDP in Hungary



Source: Tax revenues from the International Monetary Fund (1993). Budget balances from the Bank for International Settlements (1993).

in all, it appears that tax policy has been able to change more rapidly than tax administration.

Poland

Economic and tax reform started in earnest in Poland in 1989, after the selection of a Prime Minister from the Solidarity coalition. The famous "shock therapy" program included decontrol of many prices, liberalization of foreign trade, and the creation of a legal framework for privatization. It is estimated that only 4 percent of industrial production was private immediately prior to the reform. By the end of 1992, this figure was over 40 percent (Information Center, Ministry of Ownership Changes, 1993). Most of the transformation of ownership of industrial firms has taken place by so-called capital privatization—that is, either the sale of a state-owned enterprise to another corporation or an initial public offering of its shares. A plan for mass privatization, in which shares of several hundred state-owned enterprises will be of-

¹² Hungary, Poland, and the Czech Republic are associate members of the European Community.

ferred to Polish citizens at a nominal cost, was approved in May 1993 and has yet to be implemented in full.¹³ Retailing is now over 90 percent private; this transition was accomplished mostly by sales of establishments to employees. Even under socialism, Polish agriculture was predominantly private; the share has grown recently to over 90 percent.

Enterprise profits taxes. As in Hungary, an early step in tax reform was to overhaul the rules for taxing business enterprises. The pre-existing enterprise income tax rate was 65 percent for socialized businesses and 85 percent for the private sector. As noted in an economic survey by the OECD (1992, p. 167), however, "given the system of subsidies, charges, etc., it was not strictly correct to talk about a tax system for state firms." In 1989, the tax rate was lowered to 40 percent, and the law specified that private and state-owned enterprises would be subject to the same

Despite the fact that income of all businesses is taxed under the same rules, special additional taxes continue to exist for the socialized sector in Poland.

rules. In the following year, various special-purpose tax exemptions were introduced, but they have since largely disappeared, except for a provision to allow rapid depreciation for companies investing in areas of the country with very high unemployment. A further reform in 1992 allowed for a three-year carryforward of operating losses and taxation of dividends.

Despite the fact that income of all businesses is taxed under the same rules, special additional taxes continue to exist for the socialized sector. First, state-owned enterprises must pay the "dywidenda" tax on their capital.¹⁴ In effect, the *dywidenda* is a payment demanded by the state as the owner of the enterprise. It is somewhat analogous to the dividends paid by private companies, but it has been criticized for not taking into account the profitability of the enterprise. Second, state-owned enterprises pay the "popiwek" if wages increase in excess of specified norms.¹⁵ Until 1991, this tax also applied to private domestic enterprises. (Hungary has employed a similar tax-based incomes policy.) In the absence of effective control

by either market forces or regulations, the *dywidenda* and *popiwek* were intended to prevent managers from stripping the assets of state-owned enterprises through unusually large payoffs to themselves or to workers. The rules have changed frequently, but the recent trend generally has been toward lower tax rates.

Poland has taken steps to encourage foreign direct investment, but never adopted tax rules as generous as those in Hungary. For a while, joint ventures were allowed a three-year tax holiday. More recently, investments made prior to the end of 1993 have been eligible for a tax exemption up to the amount of the investment, but only if the company meets guidelines specified by the Minister of Finance for employment, productivity, and possibly other social objectives.

Taxation of goods and services. As part of the economic reforms since 1989, Poland undertook to reduce the number of turnover tax rates from about four hundred to just a handful. In 1992, turnover taxes were extended to several items including processed foods that were expected to be included in the base of a value-added tax. Aside from increasing revenues, this policy was intended to minimize the risk of a price shock from introducing the VAT, which would have made the tax unpopular with the public. In July 1993 turnover taxes indeed were replaced by a value-added tax, with rates of 7 percent and 22 percent. Although a VAT had been discussed for several years, the timetable for actually implementing it was extremely tight—six months from the enactment of legislation. Typically, the International Monetary Fund recommends a 12- to 18-month implementation period in order to lay the groundwork for administration of the tax, including registration and education of taxpayers. As of this writing, it is too soon to judge the success of the VAT.

Personal income and wage taxation. Poland implemented a general personal income tax in 1992. As in

¹³ Interestingly, Hungary has no plans to implement mass privatization, despite being the first of the formerly socialist countries to introduce laws allowing privatization of state-owned enterprises. Czechoslovakia conducted a mass privatization program involving over 2,000 enterprises in late 1991 and early 1992; the Russian Federation followed suit starting in late 1992. For a discussion of privatization methods and their tax consequences, see Kodrzycki and Zolt (1994).

¹⁴ The base for this tax is the initial fund ("capital transferred to the enterprise in the past in the form of the assets needed for engaging in economic activity"), indexed for inflation. See OECD (1992, Chapters III and IV).

¹⁵ The term *popiwek* is derived from the Polish abbreviation for tax on wage increases.

market-oriented economies, the tax generally depends on overall income rather than the particular activity that generated the income. The new personal income tax has brackets of 20, 30, and 40 percent. It replaced a 20 percent wage tax paid by state-owned enterprises and four separate income taxes paid by individuals with income from outside the socialized sector or with high income regardless of the source. For example, nonagricultural private economic activity had been taxed at marginal rates up to 75 percent as of 1989 (reduced to 50 percent in 1990). Although the new personal income tax law called for indexing brackets for inflation, the government elected not to implement indexing in 1993 because of budgetary pressures.

The tax is neutral with respect to most sources of earnings, as its base includes non-wage income such as pensions and various forms of social assistance, as well as non-monetary compensation provided by employers (which is often significant in the socialized sector).¹⁶ Almost everyone is covered by the personal income tax because the minimum threshold is quite low (considerably lower, for example, than in Hungary).¹⁷

Two aspects of the personal income tax law apparently were designed to promote its acceptability. First, upon introduction of the tax, wages and pensions were grossed up by an amount reflecting the basic 20 percent tax rate, leaving net income unchanged for much of the population.¹⁸ Second, as in Hungary, generous allowances are given for housing expenditures. Polish taxpayers purchasing new housing or renovating existing housing are able to deduct the full expenditure (up to certain limits) from taxable income. These housing deductions are of considerable popular value in a country where the government previously had limited the amount of residential space per person.

Interest income from savings and, through 1993, capital gains on the sale of securities, are exempt from the income tax. These exemptions were deemed necessary to provide support for the early stages of a capitalist economy. Also, the policy recognizes that many savings vehicles continue to earn negative rates of return after adjusting for inflation.

So far, the greatest surprise about the Polish personal income tax to its designers is how many individuals filed a tax return. Individuals with income from only a single source who did not wish to take advantage of itemized deductions did not have to file a tax return. Instead, they could request their employer or pension agency to calculate the differ-

ence between income taxes withheld and income taxes owed for the year, and make the appropriate payment (which would be deducted from their pay or pension).¹⁹ An early projection indicated that three million individuals would file returns (Białobrzęski 1991); the actual number appears to be three times higher. The cause of these high individual filings is not yet known.

As in Hungary, wage taxes to finance pensions are very high in Poland—45 percent. The number of early retirements has risen during the reform period. Some of this trend reflects persons who elect to retire in order to head off the possibility of unemployment (which provides lower benefits). In other cases, people with opportunities in the private sector have been able to take up new jobs while collecting a pension from their former employer.²⁰

*Tax administration.*²¹ As a result of the recent tax reforms, many more individuals have become liable

¹⁶ As examples of non-monetary compensation, employees of public utilities typically receive discounts on their utility bills and employees of state-owned banks are eligible for below-market rates of interest on loans. The value of such subsidies must now be included in taxable income. The Hungarian personal income tax base also includes in-kind benefits, except for education and medical services.

¹⁷ See Table 4. However, farmers do not pay income tax. They are subject to a separate agricultural tax.

¹⁸ For example, under the old wage tax, an employer would have paid a tax of 400,000 zloty for an employee earning a monthly wage of 2 million zloty. With the new personal income tax, the employee's wage would be increased to 2.5 million zloty. A 20 percent income tax (500,000 zloty) would be withheld monthly, leaving net earnings at 2 million zloty.

¹⁹ The tax treatment of married couples may have added inadvertently to the number of filers. Many married couples would be taxed the same amount, whether they chose to be taxed as two unrelated individuals or jointly. This is because in the case of joint filing, the couple computes the tax owed on half of their joint income. Their total liability is twice this amount. In other words, their average income is the basis for taxation. However, given progressive tax rates, married persons with dissimilar incomes (say, with one member in the 20 percent bracket and the other in the 40 percent bracket) would owe less tax if they filed jointly than if they were taxed individually. On the other hand, the tax system does not offer any special encouragement for couples with children to file jointly. Children's allowances are paid directly to their mother, rather than taking the form of a tax deduction. Hungary does grant tax allowances for dependent children, as is common in other European countries.

²⁰ As of 1992, the law requires pensions to be decreased for individuals who earn above a certain amount, but significant opportunities for "double dipping" continue to exist. For an excellent discussion of these trends, see Maret and Schwartz (1993).

²¹ This section is not intended to convey the impression that either progress or problems in tax administration are more notable in Poland than in the other countries of the region. It simply reflects the author's greater familiarity with Poland, and the fact that relatively little information is available publicly about the status of tax administration in the formerly socialist countries.

for payment of income taxes. The Polish government has conducted a public awareness campaign to inform taxpayers of their responsibilities and to provide specific information on how to comply with new laws. The new political framework for taxpayers and the tax authority is evident in the introduction to a pamphlet distributed to payers of the personal income tax: "Only he who pays the tax gains the moral authority to ask how his money will be spent. We will try to spend it sensibly."

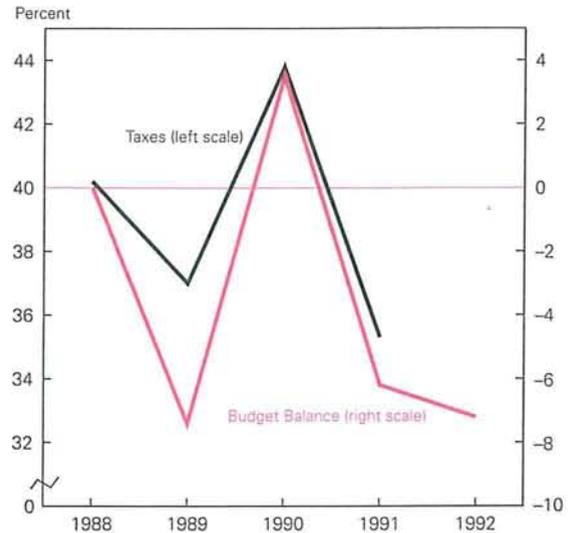
In administering the new taxes, the government has tried to impose greater uniformity in the procedures used by local tax offices. It has become evident, however, that significant progress cannot be made until a nationwide computer system for recording tax collections is implemented.²² Until that time, different offices will continue to keep somewhat different information on transactions with taxpayers.

As noted in Section I, auditing under socialism was concerned mostly with verification of transactions by a limited number of state-owned enterprises. Since beginning its reforms, Poland has established new fiscal inspection offices to deal with tax evasion that inevitably occurs in a system with many more taxpayers who are less controlled by the state. The effectiveness of these offices has been somewhat limited by start-up problems, such as the time required to recruit and train audit personnel. Furthermore, Poland is quite unusual in having separate agencies for tax collection and tax audits. This institutional arrangement has caused considerable uncertainty about the respective responsibilities of the two groups, as well as difficulties of coordination of their activities. For example, the findings of the auditors are not binding; tax collectors may decide whether or not to pursue taxpayers with added liability. Finally, the activities of the tax inspectors also have been hampered by a lack of power. Except in very limited cases, the law does not allow inspectors to investigate bank account records of taxpayers under suspicion of tax evasion. Although the fiscal inspectorate has sought expanded audit powers, the majority in Parliament appear unwilling to restrict what they view as taxpayers' essential economic freedom.²³

Tax revenues. With the temporary hyperinflation that accompanied Poland's deregulation of prices in 1990, tax revenues soared. More recently, tax revenues have been on a downward path as a share of GDP and a sizable budget deficit has developed (Figure 2). As in Hungary, officials express particular disappointment with collections of enterprise income taxes.

Figure 2

Taxes and Government Budget Balance as a Percentage of GDP in Poland



Source: Tax revenues from the International Monetary Fund (1993). Budget balances from the Bank for International Settlements (1993).

Status of Tax Reform in the Other Soviet Bloc Countries

Other countries in Central and Eastern Europe have been slower to reform their tax structures than Hungary or Poland, but most have adopted a value-added tax. In the case of the new nations of the former Soviet Union, however, tax laws are sometimes sketchy and unstable.

The former Czechoslovakia. By early 1992, the Czechoslovak Federal Ministry of Finance had developed a comprehensive tax reform proposal. The plan featured the following: a comprehensive enterprise income tax with a federal rate of 45 percent but the possibility of a 5 point increase or decrease enacted by the republics; a new personal income tax with a top

²² Considerable progress has been made to develop such a system, but the project has proved to be considerably more complex than its architects had envisioned.

²³ Interestingly, the Polish law on fiscal inspection has been criticized for allowing inspectors to reward citizens who provide information on tax evasion. Even though such authority is not unusual in the international context, it was seen in Poland as a throwback to the Stalinist era, when neighbors were encouraged to spy on each other.

rate of 47 percent and a base that would include income from interest, dividends and other forms of capital ownership; and a value-added tax levied at a 23 percent rate on most goods and a 5 percent rate for food, newspapers, and many services.

While the basic tax rules would apply equally to residents of the Czech and the Slovak Republics, the Federal Ministry of Finance acknowledged their desire for greater autonomy by allowing each republic to be responsible for administering taxes in its jurisdiction. Such a bifurcated structure would allow the possibility of different tax forms and administrative procedures, which would lower the effectiveness of tax audits of businesses operating in both republics.

In the wake of the federal reform proposal, tax officials in the Czech and Slovak Republics continued to debate whether it would be feasible and economically desirable for the two republics to adopt different tax rates. They also explored alternative formulas for revenue sharing between the national government and the governments of the republics, especially in light of the relative weakness of the Slovak economy and the calls by Slovaks for a greater share of total revenues.

These discussions of tax reform reinforced the long-standing separatist tendencies of the two republics, and Czechoslovakia split into two nations at the beginning of 1993. However, the Czech Republic and Slovakia each adopted a value-added tax and reformed income taxes. They reached an informal agreement to maintain similarity in key tax rates, in order to prevent the tax system from encouraging resources to flow from one country to the other.

Romania and Bulgaria. Romania and Bulgaria are less far along on the path of economic reform than Hungary, Poland, or the former Czechoslovakia. Nevertheless each country recently enacted a value-added tax. Romania's tax took effect in the summer of 1993, and Bulgaria's is due to be in place in the spring of 1994. In both cases, an 18 percent tax rate applies to a broad range of goods and services. The enactment of single-rate VATs signals the intention of these countries to promote tax neutrality with respect to different consumption items. Also, the simplicity of such a structure will make the new VATs easier to comply with and administer, especially in light of the lack of experience with such a tax and unsophisticated systems for tax administration.

Albania. Albania's tax reform focus has been different from those of other countries emerging from socialism. It has had to concentrate on property and excise taxes, as its economy (and therefore na-

tional income and consumption) has been in a deep depression.

The former Soviet Union. The experience of the countries of the former Soviet Union illustrates that comprehensive tax reform entails not just adopting new taxes—which they have done—but also a new attitude toward policymaking—which often is missing. For example, Russia introduced a value-added tax in January 1992. The text of the law was only a few paragraphs—apparently leaving many of the details to tax administrators. The original tax rate was quite high, 28 percent. Only a month after implementation, the tax rate applicable to many types of food was lowered to 15 percent. Within a few months, several other former republics adopted very similar tax legislation, although each nation specified a somewhat different list of exemptions. Some observers have noted that tax administrators and taxpayers in these countries are somewhat confused about the operation of a VAT—notably the distinction between zero rating and exemption.

Another unusual tax feature in much of the former Soviet Union is that businesses are not allowed to deduct wages or interest payments in calculating their income tax base. It is thought that allowing any deduction (or in some cases, wage deductions in excess of an amount based on a fixed multiple of the minimum wage) would provide incentives for excess payments. This policy is much more extreme than the Polish *popiwek*.

IV. Conclusions

This article addresses tax reform efforts in the formerly socialist countries of Central and Eastern Europe. These efforts have been influenced by recent tax reform efforts in other industrialized countries, as well as their own legacy of socialism. On the whole, what emerges is a picture of gradualism. That is, tax reform is an ongoing process.

The first steps involve removal of the grossest obstacles to the development of a market economy—widely disparate tax rates on different types of economic activity and frequent, seemingly arbitrary changes in tax rules. These measures create an environment in which market forces become more important than decisions by government, and they echo the theme of neutrality that dominated the worldwide tax reform movement of the 1980s. During the transition in Central and Eastern Europe, however, some special rules tend to be established that are not found in

advanced economies with a long history of capitalism. For example, foreign direct investment receives tax concessions, and socialized industry bears extra taxes to monitor its behavior. The tax system may be used to provide generous incentives for improving housing conditions, which were a source of dissatisfaction under the former political system.

Already, however, the broad outlines, and many of the specific details, of taxation in Hungary, Poland, and—more recently—the former Czechoslovakia are compatible with tax structures in existence in OECD countries. For example, the top rates of personal and enterprise income tax are comparable to tax rates in the OECD. Tax rates no longer vary between workers in the private and state-owned sectors, and returns to many forms of personal capital ownership are included in the income tax base. Especially after this year's reform in Hungary, value-added taxes cover a wide range of goods and services. Almost all the remaining formerly socialist countries also have indicated a desire to head in the direction of tax systems in the OECD countries by adopting a value-added tax. In the long term, it appears that if economic and political reforms continue, policymakers will be inclined to shed features that have made their tax systems distinct.

If the transition to a new tax structure is to be successful, however, tax administration must be overhauled. Even in Hungary and Poland, one often

hears that private businesses' tax payments are not rising as a share of total taxes, even though these economies are increasingly private. To the degree that this phenomenon is due to tax concessions designed to promote business development, the result represents an explicit policy decision. But to the degree that it reflects poor compliance with tax laws or leads to unintended budget deficits, improved tax administration might enhance total revenues as well as the perceived fairness of the tax system.

Creation of an effective mechanism of ensuring compliance with tax laws in Central and Eastern Europe must overcome several legacies of socialism. First, tax administrations must develop procedures enabling them to keep track of tax payments by a much larger number of taxpayers and to choose a subset of taxpayers for audit. This generally requires more personnel, the help of computer systems, and appropriate organizational development. Second, members of the public must stop viewing taxes as penalties designed to discourage certain forms of economic activity or as part of a government planning process. Rather, taxes must be considered a universal responsibility—as is the intent of the new tax laws. Finally, lawmakers must drop their belief that a strong tax inspectorate is antithetical to economic freedom. Overcoming these obstacles is taking longer than designing new tax policies.

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References

- Andersson, Krister. 1992. "Efficiency Considerations in Tax Policy." In *Fiscal Policies in Economies in Transition*, edited by Vito Tanzi. Washington: International Monetary Fund.
- Białobrzęski, J. 1991. "The Reform of Personal Income Taxation in Poland." *The Role of Tax Reform in Central and Eastern European Economies*, OECD Centre for Co-operation with European Economies in Transition. Paris: OECD.
- Bank for International Settlements. 1993. *63rd Annual Report*. Basle: Bank for International Settlements.
- Blejer, Mario, Mauro Mecagni, Ratna Sahay, Richard Hides, Barry Johnston, Piroska Nagy, and Roy Pepper. 1992. "Albania: From Isolation Toward Reform." IMF Occasional Paper 98.
- Bolkowiak, Izabela and Ewa Relewicz. 1991. "Reformy Systemu Podatkowego w Warunkach Rynkowych Przekształceń Gospodarki" (Reform of the Tax System in the Context of Transformation to a Market Economy). In *Polityka Finansowa, Stabilizacja, Transformacja (Financial Policy, Stabilization, Transformation)*, edited by Grzegorz W. Kolodko. Warsaw: Institute of Finance.
- Boskin, Michael J. and Charles E. McLure, Jr. 1990. *World Tax Reform*. San Francisco: ICS Press.
- "Capitalism Already? A Variety of Hungarian Taxes." 1992. *Transition*, The World Bank (October), p. 8.
- Casanegra de Jantscher, Milka, Carlos Silvani, and Charles L. Vehorn. 1992. "Modernizing Tax Administration." In *Fiscal Policies in Economies in Transition*, edited by Vito Tanzi. Washington: International Monetary Fund.
- Corporate Taxes: A Worldwide Summary*. 1988. London: Price Waterhouse.
- Cnossen, Sijbren. 1992. "Key Questions in Considering a Value-Added Tax for Central and Eastern European Countries." International Monetary Fund, IMF Staff Papers, Vol. 39, no. 2 (June), pp. 211–55.
- Deutsche Bank Economics Department. 1991. *Rebuilding Eastern Europe*.
- Dziennik Ustaw Rzeczypospolitej Polskiej (Daily Journal of Laws of the Polish Republic)*. Text of the law of January 8 regarding the goods

- and services tax and the excise tax. February 15, pp. 113–38. Warsaw: Biuro Prawne.
- "Eastern Europe and the Republics of the Former U.S.S.R." 1992. *World Economic Outlook*, International Monetary Fund (May), pp. 30–42.
- "Economic Stability and Transformation in Countries in Transition." 1993. *World Economic Outlook*, International Monetary Fund (May), pp. 58–69.
- "Economic Transformation in Hungary and Poland." 1990. *European Economy*, no. 43.
- Gandhi, Ved P. and Dubravko Mihajek. 1992. "Scope for Reform of Socialist Tax Systems." In *Fiscal Policies in Economies in Transition*, edited by Vito Tanzi. Washington: International Monetary Fund.
- Headly, Chris, Mark Pearson, Najma Rajah and Stephen Smith. 1992. "Report on the Czechoslovakian Government's Tax Proposals." Paper presented at the Institute of Economics Conference in Prague held on 14–15 March 1992.
- Information Center, Ministry of Ownership Changes of Poland. 1993. *Informator*.
- International Monetary Fund. 1992a. *World Economic Outlook*. May. Washington: International Monetary Fund.
- . 1992b. *World Economic Outlook*. October. Washington: International Monetary Fund.
- . 1993. *World Economic Outlook*. May. Washington: International Monetary Fund.
- Kodrzycki, Yolanda K. and Eric Zolt. 1994. "Tax Issues Arising from Privatization in the Formerly Socialist Economies." Forthcoming in *Law and Policy in International Business*. Washington: Georgetown University Law Center.
- Kopits, George. 1991. "Fiscal Reform in European Economies in Transition." International Monetary Fund, IMF Working Paper.
- . 1992. "Tax Harmonization in the European Community: Policy Issues and Analysis." International Monetary Fund, IMF Occasional Paper 94.
- Kornai, Janos. 1992. "The Postsocialist Transition and the State: Reflections in the Light of Hungarian Fiscal Problems." *The American Economic Review*, vol. 82, no. 2 (May), pp. 1–21.
- Kozłowska, Jadwiga and Edward Radzewicz. 1991. *Podatek Dochodowy od Osób Fizycznych (The Income Tax on Physical Persons)*. Warsaw: Difin.
- Kupa, M. "Implementation of Tax Reform in Hungary." *The Role of Tax Reform in Central and Eastern European Economies*, OECD Centre for Co-operation with European Economies in Transition. Paris: OECD.
- Lukács, J. 1991. "The Hungarian Experience with VAT." *The Role of Tax Reform in Central and Eastern European Economies in Transition*, OECD Centre for Co-operation with European Economies in Transition. Paris: OECD.
- Maret, Xavier and Gerd Schwartz. 1993. "Poland: The Social Safety Net During the Transition." International Monetary Fund. IMF Working Paper 42.
- Ministry of Finance of Poland. Undated. *Jak Placić Podatek Dochodowy od Osób Fizycznych za Rok 1992 (How to Pay Personal Income Tax for 1992)*.
- Mutén, Leif. 1992. "Income Tax Reform." In *Fiscal Policies in Economies in Transition*, edited by Vito Tanzi. Washington: International Monetary Fund.
- Organisation for Economic Co-operation and Development. 1990. *Revenue Statistics of OECD Member Countries 1965–1989*. Paris: OECD.
- . 1991a. *The Role of Tax Reform in Central and Eastern European Economies*. Paris: OECD.
- . 1991b. *OECD Economic Surveys: Czech and Slovak Federal Republic*. Paris: OECD.
- . 1992. *OECD Economic Surveys: Poland*. Paris: OECD.
- Ozóg, Irena. 1992. *Podatek Dochodowy od Osób Prawnych: Stan Prawny za Dzień 31 Marca 1992r (The Income Tax on Juridical Persons: Legal Status as of March 31, 1992)*. Warsaw: Difin.
- Pechman, Joseph A., ed. 1987. *Comparative Tax Systems: Europe, Canada, and Japan*. Arlington, VA: The Brookings Institution.
- Répásky, C. 1991. "Tax Incentives and the Need for Tax Neutrality: The Hungarian Experience." *The Role of Tax Reform in Central and Eastern European Economies in Transition*, OECD Centre for Co-operation with European Economies in transition. Paris: OECD.
- Tait, Alan A., ed., 1991. "Value-Added Tax: Administrative and Policy Issues." International Monetary Fund, IMF Occasional Paper 88.
- . 1992. "Introducing Value-Added Taxes." In *Fiscal Policies in Economies in Transition*, edited by Vito Tanzi. Washington: International Monetary Fund.

Commodity Prices, the Term Structure of Interest Rates, and Exchange Rates: Useful Indicators for Monetary Policy?

The Chairman of the Federal Reserve Board of Governors, in his mid-year 1993 report to Congress, averred: "The historical relationships between money and income, and between money and the price level, have largely broken down, depriving the aggregates of much of their usefulness as guides to policy. At least for the time being, M2 has been downgraded as a reliable indicator of financial conditions in the economy, and no single variable has yet been identified to take its place" (Greenspan 1993). In 1988, then-Federal Reserve Vice Chairman Manuel Johnson, citing the failure of monetary aggregates as indicators of the stance of monetary policy, offered three alternatives for this indicator role: the slope of the term structure of interest rates, a commodity price index, and the foreign exchange value of the dollar (Johnson 1988). Federal Reserve Governor Wayne Angell has been a steadfast proponent of commodity prices as a reliable indicator of emerging inflationary pressures. (See, for example, Angell 1987.)

While it is widely agreed that the monetary aggregates no longer provide reliable indications of the current and future course of inflation and of real activity, it is less widely agreed which variable or variables should replace the aggregates, or exactly how they would be used in conducting monetary policy. The first section of this article discusses the role of indicators in the conduct of monetary policy; the second section provides a simple characterization of the behavior of the proposed indicators; the third section proposes a simple model of the behavior of monetary policymakers; the fourth section explores the hypothetical interaction of monetary policy and policy indicators; and the fifth section examines the actual correlations among the proposed indicators and the ultimate targets of monetary policy over the last ten years. To anticipate, this article finds that on both theoretical and empirical grounds, the proposed indicators would be neither straightforward nor reliable guides to monetary policy. In general, no single indicator bears a stable and statistically reliable relationship to the current or future course of a policy target.

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I. The Role of Indicators in Conducting Monetary Policy

For the purposes of this article, monetary policy is assumed to control the federal funds rate. Its ultimate goals are a stable and relatively low inflation rate, and an unemployment rate that does not deviate too far or for too long from its natural rate.¹ Policy is assumed to affect its ultimate goals through a conventional transmission channel: moving the federal funds rate affects other credit market yields, which in turn affect interest-sensitive spending.² As pointed out by Milton Friedman (1967), the execution of policy is complicated in part by the lag between a change in the federal funds rate and the response of long-term rates, as well as by the lag between the

It is widely agreed that the monetary aggregates no longer provide reliable indications of the current and future course of inflation and of real activity.

response in long rates and spending responses. These lags are incorporated in many well-known and widely used econometric models of the U.S. economy; a benchmark model is the Federal Reserve Board's MIT-PENN-SSRC (MPS) quarterly model, which is documented in Brayton and Mauskopf (1985).³

Because of the delays inherent in the effects of monetary policy on its ultimate targets, policymakers desire indicators that signal the current and future course of their ultimate targets. One source of such information is the forecast from a macroeconomic model such as the MPS model. A simple (and simplified) way to conduct monetary policy is to feed the current and projected settings of the policy instrument (here, the path of the federal funds rate) into a macroeconomic model, and then to judge the forecasts of inflation and unemployment that arise from these settings. If the forecasts are not acceptable, the policymaker can determine the funds rate that would yield the desired inflation/unemployment outcome.

This approach appears to obviate the need for other indicators, since presumably all relevant mac-

roeconomic relationships are captured by the model. However, indicators such as those cited by Johnson may be useful for two reasons:

- (1) Many economists take a dim view of large macroeconomic models, claiming that they are unlikely to be stable across varying monetary and fiscal regimes, and thus may not be useful guides for conducting monetary policy. A good indicator (or set of indicators) may provide a substitute for a macroeconomic model that does not impose the economist's (possibly misspecified) structure on the relationship between the indicator and the policy target.⁴
- (2) The ultimate targets of monetary policy are observed only with a lag, while interest rates, commodity prices, and exchange rates are observed almost continuously. Thus, these indicators may provide up-to-date information about the policy targets that is not contained in lagged observations of the policy targets and indicators. This contemporaneous information can, in principle, be used to better calibrate the near-term (or current-quarter) forecasts of policy targets in a macroeconomic model, or to provide up-to-the-minute forecasts for an indicator (non-structural) model of the policy targets.

What Makes a Good Indicator?

The characteristics required of a monetary policy indicator are probably not universally agreed upon. However, several are likely to be on everyone's list.

- The indicator should be observed at a high frequency. An indicator that is observed only once a year is of limited use to monetary policymakers who meet every six weeks to decide

¹ Equivalently, concern for unemployment could be described as a desire to keep output at "potential," since potential implies full utilization of all resources, including labor and capital.

² Thus this study overlooks the debate over the "credit channel" for monetary policy studied by Bernanke and Blinder (1988), Kashyap, Stein, and Wilcox (1993), Gertler and Gilchrist (1992a, 1992b), and Oliner and Rudebusch (1993).

³ This simple characterization of monetary policy ignores the use of intermediate targets, largely for the reasons cited in Friedman (1975). For additional discussion of the early debate over the targets/instruments/indicators framework of monetary policy, see Tinbergen (1956), Brunner (1969), Hamburger (1970), and Poole (1970).

⁴ This argument has a serious flaw as well: if the underlying macroeconomic structure changes, then in almost all circumstances, the reduced-form indicator relationships discussed below will also change. These concerns are addressed in sections IV and V below.

what action to take in light of the economic news accumulated in the inter-meeting period.

- The indicator should provide a contemporaneous or an advance signal of changes in the ultimate policy targets. A series that responds only to local or market-specific conditions, and never to national, macroeconomic conditions, will be of little use to policymakers. Similarly, an indicator that contains a host of information about last year's inflation and unemployment rates is of little value.
- The signal of a change in a policy target should be reliable. An indicator that signals more changes than actually occur, or an indicator that misses important changes in the policy target, is a poor indicator. The stock market, for example, probably should not be considered a reliable indicator; it is said to have signaled nine of the last five recessions.
- The information in the indicator should reflect the information and assessments of a large number of market participants; the thicker the market for the indicator, the better. It would be risky to alter monetary policy based on the movements of an indicator that reflected the opinions of a few.

What Are the Merits of the Proposed Indicators?

The qualitative merits of the proposed indicators will be briefly discussed here. A more detailed discussion appears in section II. The question of reliability is addressed in the next section.

The slope of the term structure has been proposed as an indicator because in principle it should change in response to changes in expected inflation, and because it is observable contemporaneously and more or less continuously. As long-run inflation expectations increase, holders of long-term bonds will require an additional premium to compensate them for the expected loss in the real value of bonds as the price of goods increases during the holding period, so the yield on long bonds should increase, steepening the slope of the term structure. The converse should hold as well, so a flat or inverted term structure should indicate falling inflation expectations.

Foreign exchange is continuously traded and observable minute by minute. Investors shift from one currency into another in large part because of the expected difference in returns to holding assets denominated in different currencies. If asset returns are expected to increase in country one relative to coun-

try two, investors will shift into country one's currency, causing it to appreciate relative to country two's currency. Thus, changes in exchange rates can provide a signal of expected changes in relative interest rates and inflation rates.⁵

Commodities are continuously traded and immediately observed. The prices of commodities are thought to reflect traders' expectations of all the factors that might influence the supply of and demand for the commodity during the time that they hold the commodity. Thus, commodity prices will incorporate expectations of both general and market-specific economic conditions; the former are of interest to policymakers.

What Are the Shortcomings of the Proposed Indicators?

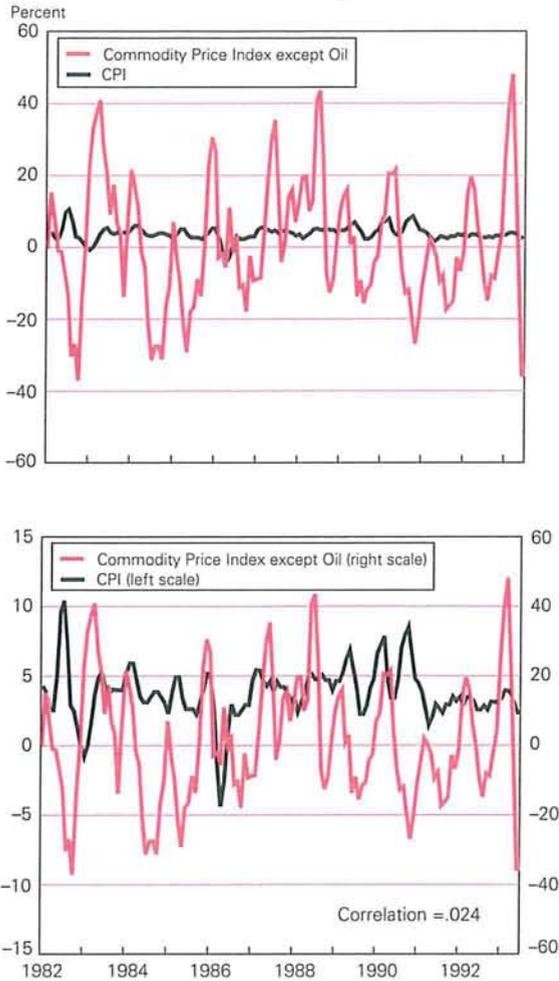
Generally, the shortcomings of each of the proposed indicators depend on the relative influence of market-specific versus aggregate economic conditions on the indicator markets. If the movements in an indicator are caused primarily by market-specific demand and supply factors, then it may be hard to disentangle the information about the aggregate conditions with which monetary policy is concerned from the market-specific information. If so, the indicator becomes useless.

Using an index of the indicators can, in principle, solve the market-specificity problem. An index, properly constructed, can average out many of the idiosyncratic fluctuations in its components. An index means three somewhat different things for the three proposed indicators. For commodities, it is a weighted average of the prices of agricultural commodities, industrial metals, and precious metals. For interest rates, it means a measure of the slope of the entire term structure, from short- to medium- to long-term rates. For exchange rates, it means a (volume-of-trade weighted) average of bilateral exchange rates with our major trading partners. In each case, it is hoped that the index will average over the movements in a particular commodity, bond, or exchange market.

⁵ The link between exchange rates and returns may be couched either in nominal terms—nominal exchange rates and nominal asset returns—or in real terms. Note that disentangling the signal provided by exchange rates for nominal output is considerably more difficult. The impact of an exchange rate appreciation on nominal output can be positive or negative, depending on the timing and magnitude of the responses of import and export prices and quantities.

Figure 1

*Three-Month Change in CPI versus
Three-Month Change in
Non-Oil Commodity Price Index*



Source: U.S. Bureau of Labor Statistics and Federal Reserve Board.

All three of the indicators can suffer from the market-specificity problem. The most obvious is the commodity price index, shown in Figure 1. When the rate of change in the commodity price index and the inflation rate are plotted on the same scale (top panel), it is clear that the commodity index is far more volatile than the inflation rate. When they are plotted on separate scales, as in the bottom panel, it becomes clear that, regardless of the scale of its movements,

the changes in the commodity index are not highly correlated with changes in the consumer price index (CPI); the correlation of the displayed series is 0.024.⁶ Thus, even this index of commodity prices varies widely in response to factors that appear unrelated to inflation. Similarly, particular points of maturity along the term structure can register the effects of market-specific developments, such as the special characteristics of certain securities in the repurchase market or differences in call provisions, rather than a general change in expected inflation. The trade-weighted exchange rate can be influenced by unusual movements in one or two of the bilateral exchange rates, or it can signal a general tightening or loosening of foreign interest rates, without any change in expectations for domestic conditions. While these observations do not rule out the possibility of useful information in the indicators, they hint at some of the difficulties that would be encountered in extracting the desired information from such an indicator.

II. A Simple Description of the Indicator Markets

This section will consider the properties of an indicator index that is not influenced by market-specific determinants. An indicator index can be thought of as if it were a single asset in which investors can invest. If investors are willing to hold this asset, it must yield at least as good a return as alternative investments. This general principle underlies the theory of arbitrage: as soon as the real, after-tax return on an asset rises perceptibly above the returns on alternative assets (after adjusting for the term and risk preferences of investors, which we ignore in this article), investors will wish to hold more of that asset, bidding up its price and lowering its return until it equals the returns on other assets. This principle implies that the returns on all assets that are considered as alternative investments will be linked; their tax- and risk-adjusted real returns should deviate from one another only while arbitrage is taking place.⁷

⁶ This is a contemporaneous correlation. The correlation between the series is a bit higher when the commodity price index is lagged two months, but it is still not statistically significant.

⁷ An extensive literature has tested this hypothesis. Generally, if the test is cast in the form "Could a well-informed investor consistently have made money by making trades at the realized yields on securities?", the answer is no. To a first approximation, then, arbitrage appears to operate well in most securities markets.

The Long-Term Bond

To illustrate the theory of arbitrage, consider the return on a long-term bond. Under the assumption that investors view shorter-term and longer-term bonds as reasonable substitutes, the return (R_t) to holding a long-term bond should equal the expected discounted return ($E_t f_{t+i}$) from holding a sequence of short-term bonds from today until the maturity m of the long-term bond, rolling the principal and the interest of each short bond into the next short bond.⁸ If this were not true, investors could shift funds into the bond that earned the higher return; this would raise the price and lower the yield on that bond. Investors would continue to do so until there was no further incentive to reallocate their portfolios.⁹

$$R_t = \sum_{i=0}^m \beta^i E_t f_{t+i}. \quad (1)$$

The same logic applies to the real (inflation-adjusted) return to holding a long-term bond. The real return on the long bond, ρ_t , should be equivalent to the discounted expected real return, $E_t(f_{t+i} - \pi_{t+i})$, from investing in a sequence of short bonds.¹⁰

$$\rho_t = \sum_{i=0}^m \beta^i E_t (f_{t+i} - \pi_{t+i}). \quad (2)$$

Commodities

The return to holding (a basket of) commodities or currencies can be considered similarly. The expected real after-tax return on a basket of commodities should equal the expected real after-tax return on competing investments. The real one-period yield on commodities, $R_{c,t}$, may be decomposed into the real "service yield" or "use value" derived from the commodity, s (for example, platinum may be used for jewelry or high-tech manufactures), and the expected capital gain, or change in the price of the commodity from the current to the next period, $E(\Delta P_c/P_c)$, adjusted for the rate of inflation in the general price level during the period, π .

$$R_{c,t} = s_t + E(\Delta P_{c,t+1}/P_{c,t}) - \pi_t.$$

For simplicity, assume that the real service yield is constant over time ($s_t = s$). Thus, the arbitrage condition links the current commodity price to the

expected commodity price next period, the real service yield, and the real return on short-term bonds. This implies that the real return to holding commodities will equal a discounted sum of expected real returns on future short bond rates.

$$R_c = E \sum_{i=0}^T \beta^i (f_{t+i} - \pi_{t+i}). \quad (3)$$

Foreign Exchange

The real exchange rate is assumed to be determined by two factors. Trade patterns among countries will determine the long-run real exchange rate, E . In the short run, the real exchange rate is determined by "uncovered interest parity." That is, the real return to investing in short-term domestic bonds, adjusted for the change in the real exchange rate, $\Delta e_t/e_t$, should equal the return to investing in short-term foreign bonds, $f_t^* - \pi_t^*$.

$$f_t - \pi_t + \Delta e_t/e_t = f_t^* - \pi_t^*.$$

The return on domestic assets can fall short of the return on foreign assets only to the extent that the increasing value of the dollar compensates investors for the difference. This arbitrage condition implies that the real exchange rate is an *undiscounted* sum of the difference between expected future domestic real rates and expected future foreign real rates.

$$e_t = E + \sum_{i=0}^{\infty} [(f_{t+i} - \pi_{t+i}) - (f_{t+i}^* - \pi_{t+i}^*)]. \quad (4)$$

Thus, when domestic short-term real rates are expected to exceed foreign short-term real rates, investors will buy domestic securities, bidding up the real exchange rate. The exchange rate will be above but falling towards E , its long-run, trade-determined equilibrium.

⁸ Yields on short-term bonds far in the future are discounted more highly than yields in the near future. In many standard formulations of this arbitrage condition, the weights decline exponentially into the future.

⁹ Equality of long-term and expected short-term yields abstracts from any term or risk premium that investors in the long bond require. In addition, investors presumably care about their after-tax return; this discussion abstracts from differential tax treatment.

¹⁰ We have no direct evidence bearing on the validity of this hypothesis, since there is no such thing as a real long-term bond, so the expected real return on long-term bonds is not observable.

The importance of the arbitrage conditions for long-term bonds, commodities, and the real exchange rate (equations (1), (3), and (4)) is that in each case, the yield is tied to expectations of future (real) yields on the short-term bond. In the next section, the importance of this relationship for the role of indicators in the conduct of monetary policy will be demonstrated. Note that in each case, the deck has been stacked in favor of each asset as an indicator, by abstracting from market-specific influences, term premia, and other factors that weaken the link between the conditions in the aggregate economy and the behavior of the indicator.

III. A Simple Characterization of Monetary Policy

Monetary policy is characterized here as setting an *instrument* in response to deviations of *policy goals* from their desired targets. The instrument of monetary policy is assumed to be the short-term nominal interest rate; most economists take the rate that the Fed can control to be the federal funds rate. Monetary policy's ultimate concerns are the rate of inflation and the level of output relative to potential. Policymakers are assumed to have a specific target rate of inflation, and they are assumed to dislike deviations of output from potential output.¹¹ Specifically, monetary policy is assumed to increase the federal funds rate by α_π for each 1 percentage point deviation of inflation from its target, and to lower the federal funds rate by α_y for every 1 percentage point deviation of output from potential.¹²

$$f_t - f_{t-1} = \alpha_\pi(\pi_t - \pi^*) + \alpha_y(y_t - y^*) \quad (5)$$

The parameters α_π and α_y determine the vigor with which monetary policy "leans against the wind": the larger are α_π and α_y , the more vigorously the Fed moves the funds rate in response to deviations of inflation or output from their targets.

Turning back to the arbitrage relationships for the indicators (indexes) in the previous section, equation (5) has two important implications for the conduct of monetary policy:

- (1) Long-term bond yields depend on expectations of the future path of short-term rates. But the path of future short-term rates is determined by the systematic response of monetary policy as summarized in equation (5). Thus, the combination of systematic monetary policy and arbitrage

in the long bond market provides a *transmission channel* for monetary policy. When the Fed is expected to hold short-term rates down, long-term rates will fall, stimulating real economic activity.

- (2) Like the long-term bonds, the yields on the other assets that might serve as indicators depend on the expected future path of short-term rates. Thus, the yields (or prices) for the potential indicators depend on the current and expected monetary response in effect over the lifetime of the assets. Put simply, the behavior of the indicators depends critically on the behavior of monetary policy. Significant changes in the response of monetary policy to its ultimate targets could significantly alter the behavior of the indicators.

How important are these observations? In the next section, simple simulations will illustrate how the behavior of these indicators changes when the behavior of monetary policy changes.

IV. The Behavior of Indicators under Different Monetary Policies

To understand the impact of different policy regimes on the behavior of the indicators, a simple model is simulated that includes the arbitrage conditions for the indicator variables, the monetary policy reaction function, and a simple description of the inflation process.¹³ In the simulations, the inflation rate begins 2 percentage points above the Fed's target, and the fed funds rate begins 2 percentage points below its equilibrium level. The target rate of inflation is 3 percent, and the equilibrium real rate is set arbitrarily at 5 percent. These initial conditions are chosen so as to approximate a period in which the inflation rate has risen above its target in part owing to low short rates. In the long run, the inflation rate will settle to its target (3 percent), the short nominal

¹¹ The target rate of inflation may be set arbitrarily by the monetary authority. The rate of potential or full-employment output is independent of the actions of the monetary authority; monetary policy may force the economy temporarily from full employment, but it cannot hold it away from potential permanently.

¹² Specifying the reaction function with the change in the funds rate rather than the level captures the interest rate smoothing motive that appears to characterize Fed behavior over the last 30 years.

¹³ See Fuhrer and Moore (1992) for a detailed exposition of the model.

rate will settle to the sum of the equilibrium real rate plus the inflation target (8 percent), and the long nominal rate will settle to the level of the short nominal rate plus a 2 percent term premium (10 percent).¹⁴

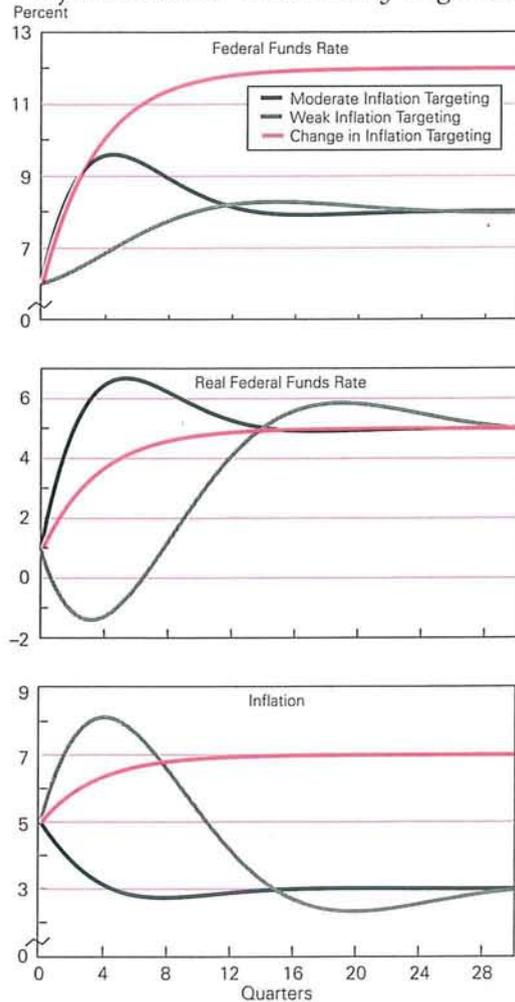
To begin, three policy regimes that target only the rate of inflation ($\alpha_y = 0$) are contrasted.¹⁵ In the first, labeled "moderate inflation targeting," the Fed raises the funds rate by 1 percentage point per year in response to a 1 percentage point deviation of inflation from its target. In the second regime, labeled "weak inflation targeting," the Fed raises the funds rate by 5 basis points per year in response to the same deviation of inflation from target. In the third, labeled "change in inflation targeting," the Fed targets the *change* in the rate of inflation: it has no specific target level for inflation, but it raises the funds rate as long as inflation is increasing (and vice versa). As shown in Figure 2, the expected paths of inflation, the funds rate, and short- and long-term real rates differ significantly for these three policy regimes. Under moderate inflation targeting, the Fed quickly raises the nominal funds rate above its long-run equilibrium, raising the short-term real rate and the expected long-term real rate, depressing output, and lowering the inflation rate smoothly to its target. Under weak inflation targeting, the funds rate slowly rises to its long-run equilibrium, leaving the short-term and long-term real rates below their equilibrium values for over five years, and only very gradually bringing inflation under control. Under change in inflation targeting, the inflation rate drifts upward, gradually stopping at about 7 percent, while the real rates gradually approach their long-run equilibrium from below.

Given the markedly different paths of short-term real rates in these simulations, and given the dependence of the indicator variables on the expected path of short-term real rates, it should not be surprising to find that the patterns in the indicator variables for these simulations are markedly different. Remember that all the simulations begin from the same set of initial conditions; the only difference is in the degree of vigor with which monetary policy responds to deviations of inflation from target.

Figure 3 depicts the rate of inflation and the slope of the term structure, defined here as the difference between the yield on the long-term nominal bond and the federal funds rate, for the three policy regimes. Depending on how monetary policy behaves, the correlation between inflation and the slope of the term structure can be positive (the top panel, moder-

Figure 2

Comparison of Federal Funds Rate, Real Federal Funds Rate, and Inflation under Three Policy Regimes



Source: Author's calculations.

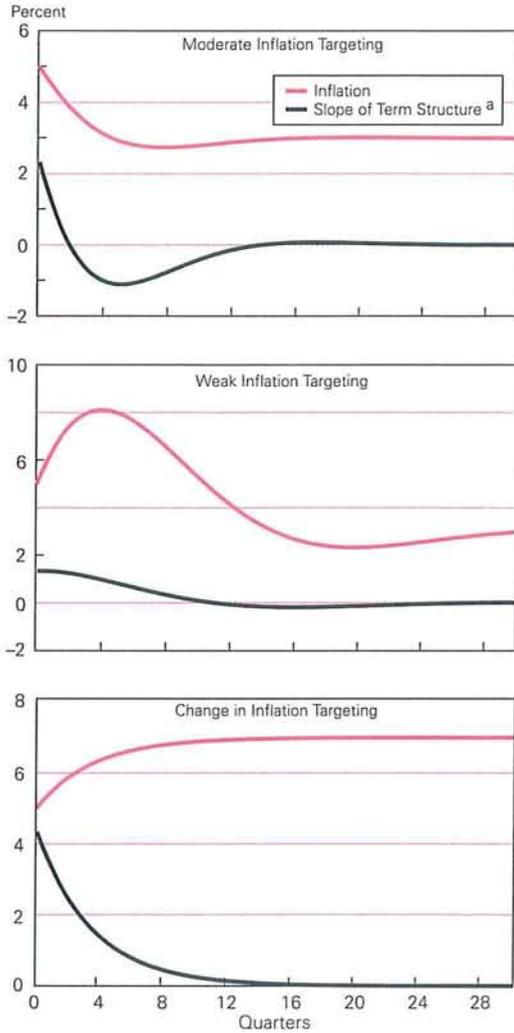
ate inflation targeting), approximately zero (the middle panel, weak inflation targeting), or negative (the bottom panel, change in inflation targeting). Thus, the signal that the slope of the term structure provides about future inflation depends critically upon

¹⁴ The simulations in this section are derived from those in Fuhrer and Moore (1992).

¹⁵ Including emphasis on the output gap does not alter any of the qualitative conclusions.

Figure 3

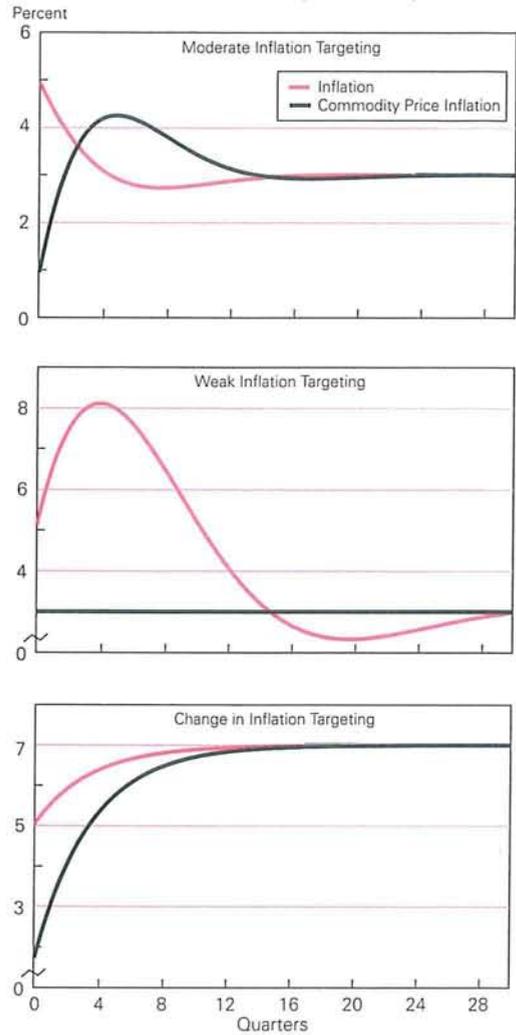
Inflation Signal Provided by Slope of Term Structure



a) As defined by the spread between the yield on the long-term nominal bond and the federal funds rate.
Source: Author's calculations.

Figure 4

Inflation Signal Provided by Nominal Commodity Price Inflation



Source: Author's calculations.

the monetary policy rule currently and expected to be in effect.¹⁶

A similar pattern emerges in Figure 4, in which the rate of inflation is plotted against the rate of nominal commodity price inflation for the three policy regimes. Again, the correlation between commodity inflation and price inflation can be negative (moderate inflation targeting), zero (weak inflation targeting), or positive (change in inflation targeting).

The important conclusion to draw from these simulations is that simple indicators, even the styl-

¹⁶ The correlation between the slope of the term structure and the rate of inflation is determined by the vigor with which policy responds to inflation. A vigorous response, as in the top panel, raises the funds rate sharply, inverting the slope of the term structure, and bringing inflation down quickly. Thus the slope of the term structure falls (turns negative) at the same time that inflation is falling, generating a positive correlation.

ized indicators simulated here, cannot be used to give an unambiguous signal about the state of inflation or the stance of monetary policy. Even the sign of the simple correlation between indicators and ultimate targets depends on the monetary policy rule in effect.¹⁷

Responding to the Indicators

In the simulations described above, the signal from the indicators depends on the policy in effect, even though policy does not respond to the indicators. However, if policy responds modestly to an indicator in the "natural" way—for example, if policy raises the funds rate when the slope of the term structure steepens—it can also reverse the sense of the indicator. For example, Figure 5 displays the inflation rate and the slope of the term structure for two degrees of term-structure responses. In the first, the Fed raises the funds rate one-for-one with inflation, and also by two-tenths of a percentage point for each percentage point of steepening in the slope of the term structure. In the second, the emphasis on the slope of the term structure is increased to about 1.2 percentage points for each percentage point steepening in the slope of the term structure.

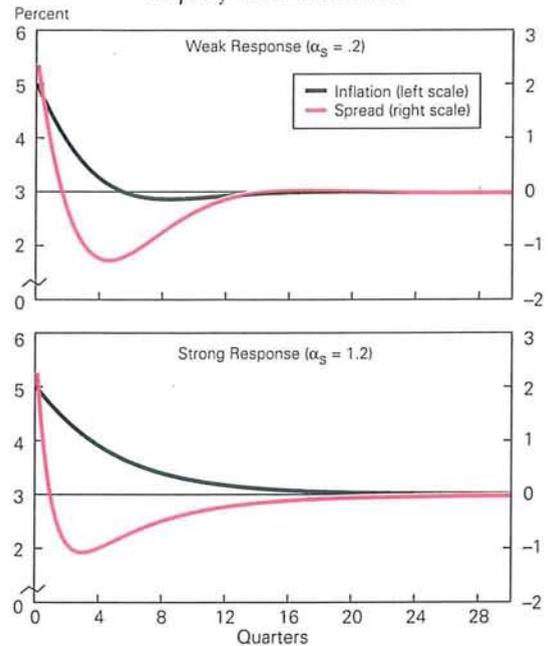
As the figure shows, the correlation between the slope of the term structure and the inflation rate reverses from the first to the second policy regime. The correlation between inflation and the slope of the term structure is 0.4 for the first regime, and -0.2 for the second. The sense of the indicator has changed: an inverted yield curve signals a high expected inflation rate.¹⁸ Note that the inflation response of policy has not changed across these two simulations; only the response to the indicator has changed.

Could Monetary Policy Make Use of the Indicators?

The preceding analysis has shown that, even under the most optimistic of circumstances, the signal provided by an indicator will depend strongly on the monetary policy regime in effect. As monetary policy changes the vigor with which it responds to deviations of inflation from target, for example, the correlation between the indicators and inflation can change sign, as well as magnitude. Given a moderate emphasis on inflation deviations, a modest policy response to the indicators themselves can also reverse the sense of the indicators. However, an alternative approach is to use the indicators in a purely statistical manner, simply relying on historical corre-

Figure 5

Inflation Signal Provided by Slope of Term Structure. Monetary Policy Responds to Slope of Term Structure.



Source: Author's calculations.

lations between the indicators and the policy targets to extract the macroeconomic information in the indicators from the idiosyncratic. If the monetary policy regime has been fairly stable, this approach has some promise. This possibility is pursued in the next section.

V. An Empirical Assessment of the Value of Asset Prices as Indicators

This section will empirically assess whether the asset prices proposed in section I could have been

¹⁷ Changes in the fiscal or monetary policy of other nations, to name two, can also affect the behavior of the indicators and their correlation with ultimate targets. These possibilities are abstracted from here, but note that they further complicate the interpretation of indicators.

¹⁸ Once again, these are contemporaneous correlations. However, the correlations of the lagged term structure slope with inflation also change sign, just as dramatically.

Table 1

Variables Used in Test of the Value of Indicators in Forecasting Policy Targets

Variable	Definition
Policy Target Variables	
CPI inflation rate	3-month log change, annual rate
Industrial production growth rate	Total industrial production, 3-month log change, annual rate
Civilian unemployment rate	
Indicator Variables	
Federal funds rate	All interest rates converted to continuous compounding basis
3-month Treasury bill rate	
6-month Treasury bill rate	
30-year Treasury constant maturity rate	
6-month commercial paper rate	
Moody's BAA corporate bond rate	
Nominal commodity price inflation	FRB non-oil experimental commodity price index, 3-month log change, annual rate
M2 growth rate	3-month log change, annual rate
Exchange rate	Multilateral trade-weighted G-10 foreign exchange rate, 3-month log change

helpful historically in forecasting the ultimate goals of monetary policy. Two questions of interest will be addressed, both related to the characteristics of a good indicator in section I. First, do the indicators provide an advance signal of changes in the policy targets? Empirically, this translates into a test of whether today's observations on the slope of the term structure, commodity prices, and the real exchange rate significantly improve our forecasts of future inflation and real activity relative to forecasts made using only information on the policy targets themselves. Second, are the indicators useful because they (unlike the policy targets) are observable contemporaneously? Specifically, given lagged observations on both the indicators and the ultimate targets, do current observations on the indicators improve our forecasts of current inflation and real activity?

To answer these questions, a simple forecasting model will be used that explains current observations on indicators and targets with lagged observations on indicators and targets (a "vector autoregression" or VAR). As indicated by the results in section IV, indicator relationships are extremely likely to change when the monetary policy regime changes. Thus this VAR forecasting model is estimated over a range believed to constitute the most recent approximately stable policy regime. The monthly sample begins in November 1982, the end of the nonborrowed reserves operating procedure, and ends in June of 1993. Monthly data are used because the information de-

lays for the price and real activity measures are typically one month. For example, the employment data for June are available in the first week in July; the producer price index (PPI) and CPI for June are available in the second or third week in July; and industrial production for June is available in the third week in July. The data definitions for the series used for interest rates, commodity prices, the exchange rate, inflation, and real activity are described in Table 1. The growth rate in M2 is included as a benchmark. Given the recent poor performance of M2, the indicators ought at least to exceed its performance as an indicator.¹⁹

Do Lagged Indicators Significantly Improve the Forecast of Targets?

To test the incremental value of lagged indicators in forecasting monetary policy targets, a VAR is estimated in which the target variables listed in Table 1 are regressed on their own lagged values, on the lags of the other target variables, and on the lags of the indicator variables listed in Table 1. Note that in

¹⁹ The individual interest rate series are used here, rather than interest rate spreads or a summary of the overall slope of the term structure. Using spreads or slopes imposes more restrictions on the ways in which interest rates can forecast policy targets, and thus gives them less of a chance. The use of individual series gives the interest rates the benefit of the doubt.

Table 2

Value of Lagged Indicators in Forecasting Policy Targets

Percent Decrease in Average Error (Numerical Decrease in Parentheses)

Indicator	CPI Inflation	Unemployment	Growth in Industrial Production
Average Error with All Lagged Data			
Baseline Model, ^a Percent	.63	.16	2.37
Reduction in Error			
All Indicators	16.7 (.11)**	-.4 (-.00)	8.4 (.20)*
Interest Rates Only	17.3 (.11)**	-1.9 (-.00)	3.4 (.08)
Commodity Inflation	2.3 (.01)	1.1 (.00)	1.8 (.04)
Exchange Rate	1.2 (.01)	-.9 (-.00)	-1.0 (-.02)
M2 Growth	7.4 (.05)**	-1.8 (-.00)	4.6 (.11)*
All Indicators (with Spreads)	3.0 (.02)	.5 (.00)	5.7 (.14)*
Spreads	3.7 (.03)*	-.9 (-.00)	.8 (.02)

^aThe Baseline Model includes lags of all three policy targets and lags of all the indicator variables listed in Table 1. The following lines in the table indicate the increase in the standard error of regression that arises when the listed variables are excluded from the model. Components may not add to totals because of correlation among the indicators. The average error is corrected for degrees of freedom.

*indicates significance at the 5 percent level.

**indicates significance at the 1 percent level.

this "baseline" model, we include the individual interest rates, rather than spreads, as indicators. Equation (6) summarizes this forecasting system,

$$X_t = AX_{t-1} + \varepsilon_t \quad (6)$$

representing the set of policy targets and indicator variables as X_t , the coefficients that link current X to lagged X 's as A , and the errors made by the forecasting system as ε_t .²⁰ Subsets of the indicator variables are then dropped from the system. If the lags of the indicator variables are important in forecasting the targets, then the fit of the regressions should deteriorate significantly. The "F-tests" reported in Table 2 measure the significance of the indicator variables in forecasting the targets, according to this criterion.

As shown in the table, neither commodity inflation nor the exchange rate provides a significant reduction in the average forecast error for either inflation or the two measures of real activity. But taken together, the lagged indicators appear to significantly improve the fit of the CPI inflation and the industrial production growth regressions, reducing the average error by 8 to 17 percent. The majority of the improvement may be attributed to the interest rate variables. None of the lagged indicators aids significantly in predicting the unemployment rate. In all cases, greater than 80 percent of the explanatory power for each of the policy targets comes from the information in the lagged policy targets.

Note that the results in Table 2 are also consistent with the standard macroeconomic relationship among short rates, credit market yields, interest-sensitive spending, and inflation. That is, interest rates may be useful in forecasting inflation and real activity because they play a part in the standard monetary transmission channel from rates to interest-sensitive spending to inflation, not because they reflect market participants' expectations about future inflation and real activity.

To distinguish between interest rates that enter because of their role in the transmission channel and interest rates that enter because of their indicator properties, the interest rates are restricted to enter the forecasting system only as *spreads* that reflect the slope of the term structure or risk differentials. Thus, instead of the full list of interest rates in Table 1, the VAR includes only a Treasury term spread (the difference between the 30-year constant maturity rate and the 6-month bill rate); a long-term risk spread (the difference between the 30-year Treasury constant maturity rate and the BAA corporate bond rate); and a short-term risk spread (the difference between the 6-month commercial paper rate and the 6-month Treasury bill rate).²¹ The federal funds rate and the 3-month Treasury bill rate are excluded.

²⁰ Lag lengths for the vector autoregression are chosen using conventional methods.

None of the individual spreads significantly reduces the average error in predicting inflation. The long-term risk spread makes a marginal improvement to the forecast of industrial production growth. As shown in the bottom row of Table 2, the three spreads jointly improve the forecast error for inflation and industrial production growth by 3.7 percent and 0.8 percent, respectively, but insignificantly so for growth in industrial production and with only moderate statistical reliability for inflation. These results suggest that lagged interest rates help predict inflation and real activity because of their role in the standard monetary transmission mechanism, not because of their indicator properties. Altogether, these results do not suggest that the lagged indicator variables contain much important information for monetary policy targets.

Does Contemporaneous Information on Indicators Improve the Current Forecast of Targets?

The appeal of using commodity prices, exchange rates, and the slope of the term structure to aid in the conduct of monetary policy lies in part in the timeliness of these potential indicators. When information on the targets of monetary policy arrives only with a lag, the immediate observations that are available for commodities, foreign exchange, and interest rates may be of use in assessing the current state of the economy. Thus another important role for these indicators could be in providing reliable indications of the as yet unobserved current state of the economy.

One way to assess the validity of this hypothesis is to partition the information available for forecasting policy targets into lagged information and current information. The VAR is an uninterpreted set of regression equations that does just that: it assumes that each variable to be explained, x_t , depends on the contribution of lagged information, AX_{t-1} , plus the current information that could not have been predicted last period, ε_t .²² The information can be partitioned further into policy target variables, X^T , and indicator variables, X^I , so that the current information represented by ε_t consists of "news" about the policy targets, ε^T , and news about the indicators, ε^I .

$$\begin{bmatrix} X_t^T \\ X_t^I \end{bmatrix} = \begin{bmatrix} A_{TT} & A_{TI} \\ A_{IT} & A_{II} \end{bmatrix} + \begin{bmatrix} \varepsilon_t^T \\ \varepsilon_t^I \end{bmatrix} \quad (7)$$

The analysis in the preceding section abstracted from the current information, assessing only which lagged

variables (X_{t-1}) were important in predicting today's policy targets.

Current observations on the indicators will improve the current forecast of the unobservable policy targets if the news about indicators is correlated with the news about policy targets (that is, if ε_t^T is correlated with ε_t^I). To make the discussion concrete, consider a forecast of the CPI inflation rate for June 1993. Suppose the forecast for June 1993 using all the information up through May 1993 is 3 percent. The CPI for June will not be released until July of 1993; however, monetary policymakers would still like to know if the current readings of the indicators are signalling a significant change in inflation. Because they can observe interest rates, commodity prices, and exchange rates for June, they can (in principle) use that information to improve their forecast of the CPI for June. They will be able to improve their forecast if, on average over history, the news (the incremental information above and beyond that contained in the lagged data) in the current month's indicators has been correlated with the news in the policy targets.

Suppose that, historically, exchange rates that were higher than the lagged data would have predicted were associated with inflation rates higher than those that the lagged data would have predicted. Then, if the June observation for the exchange rate is higher than the lagged data predicted for June, policymakers would revise the 3 percent inflation forecast upward. The amount would depend on the correlation between exchange rate and inflation news over history. The term "indicator coefficient" will denote the numbers that tell how to revise a forecast of a policy target, given a contemporaneous observation on an indicator. In the VAR forecasting system summarized in the equations in (7), these coefficients are obtained by regressing the forecast error for a policy target on the forecast errors for the indicators.

Table 3 presents the average forecast error made by the forecasting equations summarized in (7) using only lagged data (the top row), and the percentage decrease in the average forecast error from including

²¹ The private term spread, the difference between the BAA corporate rate and the 6-month commercial paper rate, is not included because it can be formed as the government term spread plus the long-term private risk spread less the short-term private risk spread. It is thus perfectly collinear with these other regressors, and cannot be included in the regression.

²² See Fuhrer (1993) for a discussion of this methodology. For this monthly VAR, 2 to 5 lags of each of 12 variables are included, leaving 79 to 91 degrees of freedom from 128 observations.

Table 3
Percentage Reduction in Average Forecast Error from Including Contemporaneous Observations on Indicator Variables

Information Included	Policy Target		
	CPI Inflation	Unemployment	Growth in Industrial Production
Lagged Variables Only (Average Error)	.63	.16	2.37
Lagged plus All Contemporaneous	3.6	8.4	9.7
Lagged plus Interest Rates	2.7	4.7	5.6
Lagged plus Commodity Prices	.0	.0	.0
Lagged plus Exchange Rate	.1	.1	.0
Lagged plus M2 Growth	.8	1.9	4.2

contemporaneous observations on the indicators.²³ As the table indicates, adding contemporaneous observations on all the indicators decreases the average forecast error by 3.6 percent for inflation, 8.4 percent for unemployment, and 9.7 percent for industrial production growth. The interest rate indicators account for most of the inflation improvement, more than half of the unemployment improvement, and more than half of the industrial production growth improvement. Growth of nominal M2 improves the inflation forecast by a bit less than 1 percent, while it improves the industrial production growth forecast by 4.2 percent. Remember that these are percentage decreases in forecast errors: a 3.6 percent decrease in the average inflation error lowers the error from 0.63 percentage points to 0.61 percentage points.

The next table shows which individual indicators contribute most to improving the contemporaneous forecast of policy targets, in terms of both economic significance and statistical reliability. Perhaps the most notable feature of Table 4 is the relative scarcity of statistically reliable indicators of policy targets. (Reliability is denoted by one (weak reliability) or two (stronger reliability) asterisks.)²⁴ All of the data are expressed in equivalent units (percent per year), so

Table 4
Indicator Coefficients^a and Significance of Individual Indicators for Each Policy Target

Indicator	Policy Target		
	CPI Inflation	Unemployment	Growth in Industrial Production
Federal funds rate	-.13	-.17*	-.25
3-month T-bill rate	1.13	.37	-4.98
6-month T-bill rate	-.49	-.49	7.72
30-year Treasury rate	.59	-.29*	3.03
6-month commercial paper rate	-.48	.19	-1.05
BAA corporate bond rate	-.62	.32*	-2.17
Commodity inflation	-.00085	-.00014	.00041
Exchange rate appreciation	-.0019	-.00051	.0018
3-month growth in M2	-.085	-.032*	.73**

^aPercentage point revision in the target variable that accompanies a 1 percentage point surprise in the indicator variable.

*Indicates significance at approximately the 10% level, ** at the 5% level.

the indicator coefficients should be interpreted as the percentage point revision in the target variable that accompanies a 1 percentage point surprise in the

²³ The results in Table 3 are based on an unrestricted vector autoregression in the levels of the variables listed in Table 1. In addition, vector autoregressions that explicitly include interest rate spreads (the risk spread between the 6-month commercial paper rate and the 6-month Treasury bill rate, the risk spread between the BAA corporate bond rate and the 30-year Treasury constant maturity rate, and the term spread between the 30-year Treasury constant maturity rate and the 6-month Treasury bill rate), and vector autoregressions that imposed cointegrating restrictions using Johansen's method were estimated (Johansen and Juselius 1990). The qualitative results did not depend upon these alterations or combinations of them. Including the spreads explicitly imposes simple linear restrictions on the unrestricted vector autoregression. Imposing cointegrating restrictions based on data from such a short sample is generally undesirable. However, since monetary policy can certainly affect the order of integration and the dynamic correlations of all of the nominal variables in the data set, using data from earlier monetary regimes would also be undesirable.

²⁴ Because the indicator coefficients depend upon the estimated forecasting coefficients in equation (6), more stringent measures of statistical reliability must be applied. As a rough approximation, the cutoff points in the standard t-distribution for 5 percent and 1 percent significance are used as the significance levels for 10 percent and 5 percent, respectively.

indicator variable.²⁵ Note that none of the indicator variables reliably signals changes in CPI inflation. Of all the indicator/policy target pairs, only M2 growth provides a strongly reliable signal about contemporaneous growth in industrial production.

Interestingly, the money growth indicator performs as well as any other indicator in the set considered. This places the modest "success" of the indicators in predicting inflation and output in perspective. After all, as the beginning of this article notes, the Federal Reserve System has abandoned money growth as the primary indicator of the stance of monetary policy, because its relationship with the ultimate targets is too unreliable.

Finally, the modest improvements to forecast performance afforded by the indicators should be taken as upper bounds to the indicator information unique to the proposed indicators. We have included only three measures of inflation and real activity in the lagged data. A host of other measures have been excluded: disaggregated expenditure categories such as consumption, investment, trade balance, and fiscal stance; and other high-frequency (but still observed with a delay) data, such as orders and housing starts, that are thought to provide early, direct measures of changes in the state of the macroeconomy. The inclusion of these data in the vector autoregression would almost certainly decrease the importance of both the lagged and the contemporaneous observations on the indicators in forecasting policy targets.

VI. Conclusions

A good indicator of the ultimate targets of monetary policy is hard to come by. Most variables that are contemporaneously observable are quite volatile and do not respond primarily to changes in aggregate real activity and inflation. Even indexes that combine the more disaggregated variables exhibit large swings that are only weakly correlated with movements in policy targets.

If it were possible to construct an ideal indicator that averaged away all idiosyncratic market influences, it might still be hard to interpret its signals. As shown in section IV, the expected correlation between ideal indicators and policy targets varies dramatically across different monetary policy regimes. If

policy were to respond directly to signals from the indicators, this would make it more difficult to interpret their signals.

Putting these *a priori* concerns aside, the accuracy and reliability of potential indicators can still be tested by measuring their contribution to forecasts of policy targets during the most recent, presumably stable, monetary policy regime. This study tests to see whether indicators provide significant incremental information about future or contemporaneous policy targets. The results suggest that the lagged indicators taken together can reduce the average forecast error for inflation by about 10 basis points, for unemployment by essentially zero, and for growth in industrial production by about 20 basis points. The modest improvement in inflation appears to arise primarily from the inclusion of interest rate variables, and not commodity prices or the exchange rate. The improvement in the industrial production forecast is attributed evenly to the interest rate variables and to M2 growth, which accounts for about 10 basis points.

The contemporaneous observability of the indicators, while in principle an appealing characteristic, in practice appears to be of relatively little use. Using the contemporaneously observable indicators to update a forecast based on lagged information yields very modest improvements. The results presented here suggest that this information would improve the current-period forecast error by less than 4 percent for inflation—about 2 basis points—and by 8 to 9 percent for unemployment and industrial production growth. Moreover, no single indicator provides an economically important and statistically reliable signal of inflation or real activity. This complicates the proposed simplicity of the indicator approach, as the net effect of movements in a combination of indicators must be understood in order to reliably improve a forecast of policy targets. Overall, this study suggests that using indicators as guides to monetary policy is neither less complicated nor more reliable than the macroeconomic modeling approach described in section I.

²⁵ As indicated in Figure 1, commodity price inflation is much more volatile than CPI inflation, so its indicator coefficient is much smaller than the coefficients on more stable indicators, such as the 3-month Treasury bill rate. The same is true of the change in the exchange rate. Industrial production growth is the most volatile of the policy targets, and thus all of its indicator coefficients are larger than their counterparts for the other two policy targets.

References

- Angell, Wayne D. 1987. "Commodities and Monetary Policy." *The Journal of Commerce*, Tuesday, December 22.
- Bernanke, Ben and Alan Blinder. 1988. "Credit, Money, and Aggregate Demand." *American Economic Review, Papers and Proceedings*, vol. 78, pp. 435-39.
- Brayton, Flint and Eileen Mauskopf. 1985. "The MPS Quarterly Model of the U.S. Economy." *Economic Modelling*, pp. 170-292, July.
- Brunner, Karl, ed. 1969. *Targets and Indicators of Monetary Policy*. San Francisco: Chandler Publishing.
- Friedman, Benjamin M. 1975. "Targets, Instruments, and Indicators of Monetary Policy." *Journal of Monetary Economics*, vol. 1, pp. 443-73.
- Friedman, Milton. 1967. "The Lag in Effect of Monetary Policy." *Journal of Political Economy*, vol. 69 (October), pp. 447-66.
- Fuhrer, Jeffrey. 1993. "What Role Does Consumer Sentiment Play in the U.S. Macroeconomy?" *New England Economic Review*, January/February, pp. 32-44.
- Fuhrer, Jeffrey and George Moore. 1992. "Monetary Policy Rules and the Indicator Properties of Asset Prices." *Journal of Monetary Economics*, vol. 29, pp. 303-36.
- Gertler, Mark and Simon Gilchrist. 1992a. "The Role of Credit Market Imperfections in the Monetary Transmission Mechanism: Arguments and Evidence." Manuscript, Board of Governors of the Federal Reserve System.
- . 1992b. "Monetary Policy, Business Cycles and the Behavior of Small Manufacturing Firms." Manuscript, Board of Governors of the Federal Reserve System.
- Greenspan, Alan. 1993. Transcript of Hearings before the U.S. Senate, Committee on Banking, Housing, and Urban Affairs. Hearing on the Federal Reserve's Second Annual Report on Monetary Policy. Washington, D.C. Thursday, July 22, 1993, pp. 55-56 [Ace-Federal Reporters, Inc.].
- Hamburger, Michael J. 1970. "Indicators of Monetary Policy: The Arguments and the Evidence." *American Economic Review*, vol. 60 (March), pp. 32-39.
- Johansen, Søren and Katerina Juselius. 1990. "Maximum Likelihood Estimation and Inference on Cointegration, with Applications to the Demand for Money." *Oxford Bulletin of Economics and Statistics*, vol. 52, pp. 169-209.
- Johnson, M. H. 1988. "Current Perspectives on Monetary Policy." *Cato Journal*, vol. 8, pp. 253-60.
- Kashyap, Anil, Jeremy Stein and David Wilcox. 1993. "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance." *American Economic Review*, vol. 83, No. 1 (March), pp. 78-98.
- Oliner, Stephen and Glenn Rudebusch. 1993. "Is There a Broad Credit Channel for Monetary Policy?" Manuscript, Board of Governors of the Federal Reserve System.
- Poole, William. 1970. "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model." *Quarterly Journal of Economics*, vol. 84 (May), pp. 197-216.
- Tinbergen, Jan. 1956. *The Theory of Economic Policy*. Amsterdam: North Holland.

Business Failures in New England

During the 1980s, the New England economy prospered relative to the nation as a whole, with lower unemployment rates, more rapidly rising real estate prices, and lower rates of business failures. As the economic tide turned against New England at the end of the decade, the unemployment rate rose, real estate prices fell, and the rate of business failures soared, in absolute terms as well as relative to nationwide statistics. However, this recent wave of business failures appears to be far in excess of that attributable to the decline in New England economic activity.

The sharp rise in business failure rates in New England has several undesirable implications for the regional economy. Firms that cease to exist will not rehire workers as the economy recovers, so employees must seek alternative sources of employment. And, the buildings and equipment of failed businesses may not be easily converted for use by other businesses. Moreover, banks that have suffered from a spate of business bankruptcies among their loan customers may be less willing and less able to finance new ventures. Finally, entrepreneurs may be discouraged from undertaking new ventures if the chances of success appear remote. Each of these factors would tend to slow economic recovery.

One possible reason for the recent increase in business failures may be that New England has been disproportionately affected by the current economic downturn. But while the New England unemployment rate did rise substantially more (and New England payroll employment decline substantially more) than the national rate, the relative increase seems small in comparison to the rise in the New England business failure rate. Furthermore, the New England unemployment rate in this recession attained a peak only slightly higher than in the previous recession, while a business failure rate that more than doubled is far out of line with recent business cycle experience in New England. In fact, over the years the business failure rate in New England has

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shown surprisingly little response to business cycle movements. An alternative explanation might be an industry mix effect, with the industries most severely affected by the weak economy also being the major industries in New England. The evidence, however, indicates that most industries in New England experienced similar increases in their failure rates.

A third possible explanation could be problems with credit availability. Many businesses use real estate to secure loans, and this collateral diminished in value significantly during the real estate deflation of the late 1980s and early 1990s. The impact of this deflation on bank capital was considerable. The widespread loss of bank capital primarily associated with the real estate bust caused many banks to fall below required capital-to-asset ratios. As a consequence, many banks in New England failed, and many of the survivors were forced to raise their capital-to-asset ratios. They accomplished this primarily by shrinking liabilities and assets, in particular, loans. The combination of bank failures and bank shrinkage severed many historical lending relationships as old loans were called, credit lines were not renewed, and new loans often were unavailable from a firm's traditional lenders. This decline in credit availability was particularly troublesome for small and medium-sized firms that relied primarily on bank loans to satisfy their credit needs. The evidence presented in this article indicates that difficulties in the banking sector have contributed significantly to the very high rate of business failures in New England.

I. A Description of Business Failures

A company gets into financial distress when it does not have sufficient cash flow to meet its obligations to creditors. When a company fails to make timely payment on a debt, creditors frequently will try to force the company to sell part or all of its assets to meet the debt payment. The distressed company may be able to avoid liquidating its assets while it tries to reorganize the business, either by privately renegotiating its financial obligations with its creditors or by filing for protection from its creditors under the 1978 Bankruptcy Code. Alternatively, the business can cease operations and liquidate its assets. This action may or may not be accompanied by a filing for bankruptcy. Since shareholders have limited liability as a result of incorporating, many smaller incorporated businesses with few or no assets choose not to file formally for bankruptcy. This study will

focus on total business failures, including not only firms that cease operations and file for bankruptcy but also those that liquidate their business (with losses to creditors) without the oversight of the courts.

If a company decides to file for bankruptcy, one option is to file under Chapter 7 of the Bankruptcy Code and liquidate company assets under the supervision of the court. Once the assets are sold, the court distributes the funds among the creditors according to the absolute priority rule, which states that creditors will be paid according to the seniority of their claims. According to summary tables for 1992 compiled by the Administrative Office of the United States Bankruptcy Courts, Chapter 7 filings represented 43 percent of total U.S. business bankruptcy filings.

Most large businesses and many small businesses initially file for bankruptcy under Chapter 11, however. This category represented 29 percent of all 1992 business bankruptcy filings. The underlying assumption of Chapter 11 is that the value of the business as a "going concern" is greater than the value of the liquidated assets. A company that files for bankruptcy under this chapter is provided temporary relief from its creditors while the debtor prepares a plan to reorganize. Moreover, the existing managers usually continue to operate the company after filing for Chapter 11 protection, although they are closely monitored by the creditors. To emerge from bankruptcy as a going concern, the company's reorganization plan must be approved by a majority of each class of creditors and by two-thirds of the book value of each class of creditors.¹

Despite the fact that Chapter 11 offers the company the chance to remain a going concern, most companies that file under Chapter 11 ultimately choose to liquidate their assets, either because of their financial condition or because they cannot satisfy the competing claims of their creditors. Analyzing Chapter 11 cases filed from 1979 to 1986, Flynn (1989) found that, of the 78,911 Chapter 11 cases that were closed, only 7 percent of the companies emerged from bankruptcy as a going concern, while 36 percent of the cases were converted to Chapter 7 for liquidation.² Fifty-five percent of the cases did not have a reorganization plan confirmed, and the companies were liquidated within Chapter 11. The remaining 2

¹ In a reorganization plan, creditors are assigned to a class based on the similarity of their claims. For example, secured and unsecured creditors are in different classes, and a separate class can be established for small claims to be paid in full.

² Of the 28,640 Chapter 11 cases that were converted to Chapter 7, 70 percent had no assets to liquidate.

percent of the closed Chapter 11 cases were converted to Chapters 12 or 13.³

The principal source of data on business failures is the Dun & Bradstreet Corporation. Business failures are defined as those businesses that ceased operations with the result that creditors suffered losses. That is, companies that pay their creditors in full when they go out of business are not included. The data are compiled from bankruptcy court filings, credit management groups, boards of trade, and notices of business closings. Because Dun & Bradstreet expanded its coverage of business failures in 1984 to include additional industries, the post-1984 data on the number of failures are not directly comparable with the pre-1984 data.⁴

The recent wave of business failures appears to be far in excess of that attributable to the decline in New England economic activity.

For the purposes of this study, the Dun & Bradstreet business failure data have a number of advantages over the bankruptcy filings collected by the Administrative Office of the United States Courts. The primary advantage is that the business failure data are more comprehensive than the bankruptcy filing data. In addition, because the Dun & Bradstreet data include only firms that cease operations, they count firms at the time they discontinue operations, not when they file for bankruptcy protection. The data do exclude financially troubled firms that successfully reorganize privately or through Chapter 11, but this exclusion is not a serious problem for this study. While social costs are associated with successfully reorganizing a company, either privately or under Chapter 11, the firms that successfully reorganize represent only a small fraction of the businesses that get into serious financial difficulty. Moreover, the costs to the economy of a successful reorganization are not as large as those of a business failure.⁵ Companies that go out of business also incur some of the same direct and indirect costs of distress and, as noted above, failed companies impose additional costs on society because they do not rehire

workers or reemploy their capital as the economy recovers.

The Dun & Bradstreet data have two additional advantages. First, they can be disaggregated by industry, while the bankruptcy filings data cannot. Second, because the Bankruptcy Code was changed in 1978, the business failure data provide a longer time series of consistently measured data.⁶

Figure 1 shows the business failure rate for New England, the number of business failures expressed as a percent of the total number of businesses, from 1950 to 1992. Because Dun & Bradstreet expanded its coverage in 1984, the data were compared with the bankruptcy statistics compiled by the Administrative Office of the United States Bankruptcy Courts for the period after the 1978 change in the Bankruptcy Code. The two series generally move together, suggesting that, for the purposes of this study, the change in coverage in the business failure data is not a serious drawback.⁷ For this reason, Dun & Bradstreet data were used for the remainder of this study.

³ Chapter 12 bankruptcies pertain to farms and represent only 2 percent of 1992 business filings. Chapter 13 is for individuals who have regular incomes and also own a business. Chapter 13 filings represent 16 percent of 1992 business filings.

⁴ In 1984, Dun & Bradstreet expanded coverage of business failures to include the following additional industry sectors: agriculture, forestry and fishing; finance, insurance and real estate; and the services sector. In addition, over time Dun & Bradstreet has continued to identify and add to its coverage of existing businesses, especially over the past three years. Thus, the time series for the number of business failures would tend to overstate the actual growth rate of business failures.

⁵ Both direct costs and indirect costs are associated with business reorganization. Direct costs include legal fees, accountant fees, consultant fees, and filing fees in the case of Chapter 11 reorganizations. Indirect costs include the cost of sales lost because consumers are concerned about doing business with a company that may be out of business in a short period of time, the increased operating costs associated with the loss of employees and the increased cost of capital, and costs that occur because the firm can become less competitive when it is in financial distress.

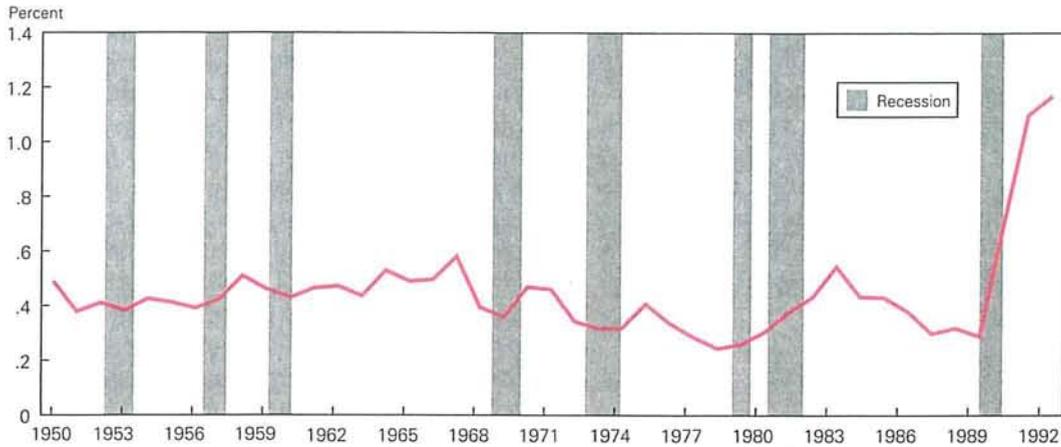
⁶ Failure rates are preferable to bankruptcy rates because they are less susceptible to legal changes. The changes in the 1978 Bankruptcy Code encouraged firms to file for bankruptcy (see Bradley and Rosenzweig 1992). However, most business failures with creditor losses probably would have occurred regardless of the Bankruptcy Code provisions.

While the impact of the expanded coverage of the Dun & Bradstreet data, particularly in 1984 and again in the past few years, can be seen in both the number of failures and the number of businesses, any distortion of their ratio, the failure rate, should be minor. To guard against distortions in the failure rate due to the increasing breadth of coverage, Dun & Bradstreet calculates the failure rate using only the failures of businesses listed in its census of businesses.

⁷ The bankruptcy statistics include businesses that filed under Chapters 7, 11, 12, or 13. The timing of the two series differs because the Bankruptcy Courts' data are compiled by fiscal year, while the Dun & Bradstreet data are compiled by calendar year.

Figure 1

Business Failure Rate in New England



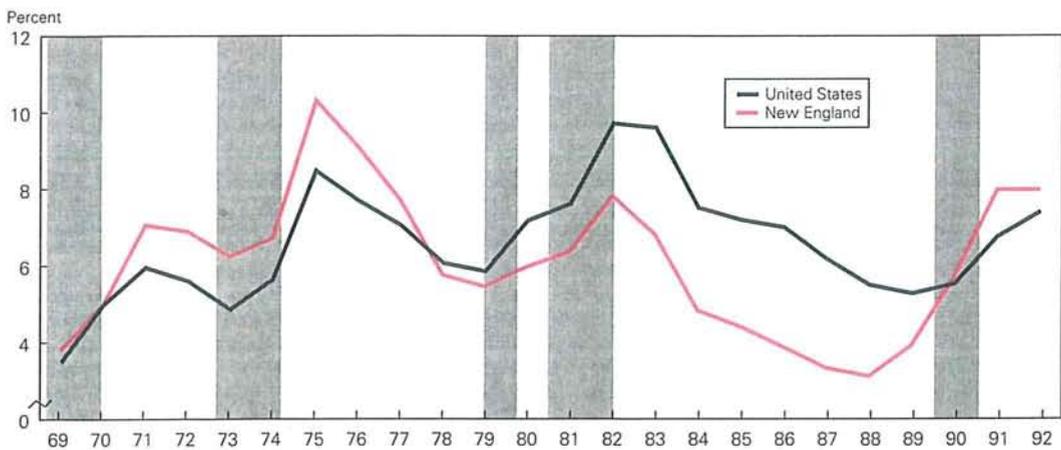
Source: Dun & Bradstreet Corporation.

For the past three years, the failure rate for New England businesses has been dramatically higher than at any time in the previous 40 years (Figure 1). The absence of a pronounced business cycle movement in the series is striking. Unemployment rates in

New England and in the United States also provide some evidence that the higher failure rate in New England is not due solely to the recent recession (Figure 2). While the unemployment rate in New England did rise substantially between 1988 and

Figure 2

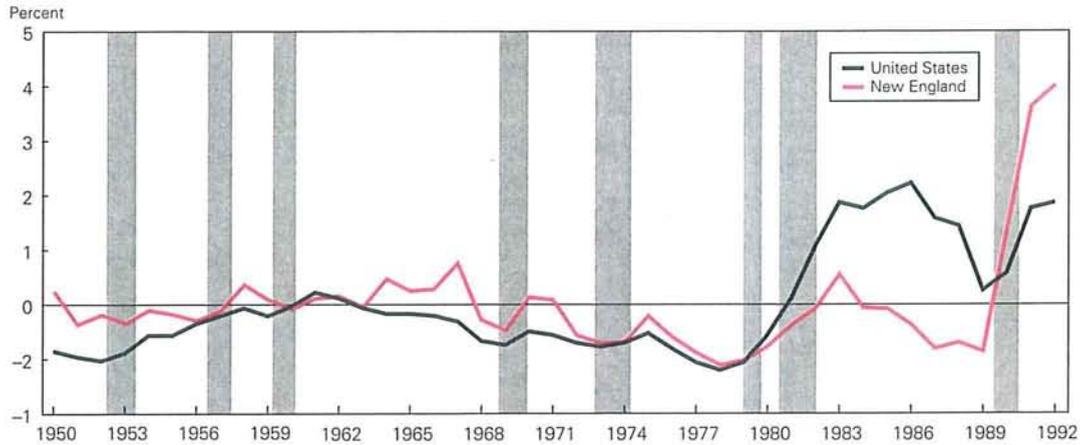
Unemployment Rates



Source: U.S. Bureau of Labor Statistics.

Figure 3

Standardized^a Business Failure Rates



a) Rates adjusted for differences in their means and standard deviations. Source: Dun & Bradstreet Corporation.

1992, it did not exceed the national rate by enough to correspond to the much higher business failure rate in New England. Furthermore, the New England unemployment rate for 1992 was only slightly higher than its 1982 value and substantially below the rate in 1975. Given that neither 1975 nor 1982 were years with substantial numbers of business failures in New England, the very high rate associated with the past recession stands out as being atypical of recent business cycle experience.

In Figure 3, the business failure rates for New England and the United States have been adjusted for differences in their means and standard deviations. (The mean failure rate over the period 1950 to 1990 is subtracted from the annual failure rate and the result is then divided by the standard deviation of the failure rate.) This adjustment permits an evaluation of whether recent failure rates were unusually high relative to historical experience, as well as comparisons of two failure rates with different means and standard deviations.⁸

The adjusted business failure rate for the United States over the past two years is high relative to its average over the past 40 years, but it is lower than it was in the periods associated with the 1980 and 1982 recessions and the problems in the farm and oil sectors in the mid 1980s. The adjusted New England failure rate is nearly twice that of the nation over the

past three years, while the New England unemployment rate is only slightly higher than the national average. The recent New England failure rate is also very high relative to its own values in previous business cycle troughs.

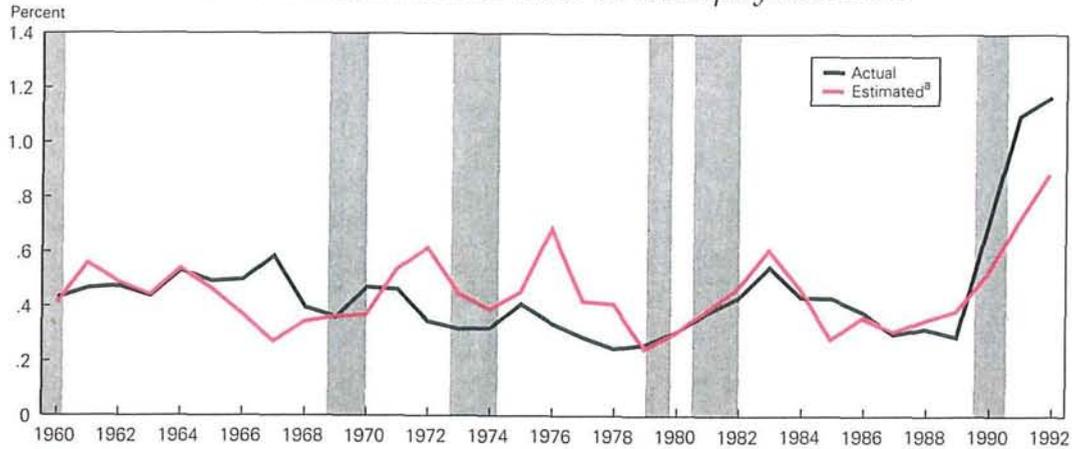
II. New England Business Failures and the Economy

While more business failures occur during a general economic downturn, the increase in the New England failure rate in previous recession periods was not striking. This may reflect the ability of most businesses and creditors to weather general recessions, so long as economic problems are not unusually severe or do not last for an extended period. The mid 1980s' bulge in the national business failure rate

⁸ Failure rates may exhibit different means and standard deviations because of differences in the composition of businesses (size, sensitivity to business cycles, new incorporations), differences in the willingness to declare bankruptcy, and differences in the pattern of economic shocks. For example, regions of the country experiencing frequent and sizable economic downturns are likely to structure their business (and its financing) to withstand the normal range of shocks because borrowers, lenders, and employees are aware of the business risks. In that case, only unusually severe shocks would result in abnormally high failure rates for that region.

Figure 4

*Actual Business Failure Rate in New England
and the Estimated Rate Based on Unemployment Data*



a) Based on regressions using three lagged values of the rate of growth in payroll employment. See Table 1.
Source: Dun & Bradstreet Corporation (actual data).

(Figure 3) was primarily the result of business failures in oil-dependent and farm states. The decrease in oil prices was particularly dramatic, and recovery from the oil shock extended over several years. Similarly, the effects of the sharp declines in prices of agricultural land and crops showed up prominently in the national data because these effects were widespread.

The New England unemployment rate during the most recent recession, while high, was not dramatically higher than in earlier recessions. However, this high unemployment rate has persisted since 1990 and has yet to show any dramatic decline. Even so, it may understate the extent of the problems in the New England economy. Regional unemployment rates may mask the extent of the regional decline in jobs, as unemployed workers migrate to other areas of the country where job prospects are better; for this reason, the change in payroll employment may better capture the depth and extent of the economic downturn. In fact, nonfarm payroll employment for New England has declined far more dramatically in the recent recession than unemployment rates have risen. Regional payroll employment data are also available over a longer period of time than are regional unemployment rates, with the annual growth rate in New England payroll employment available back to 1956.

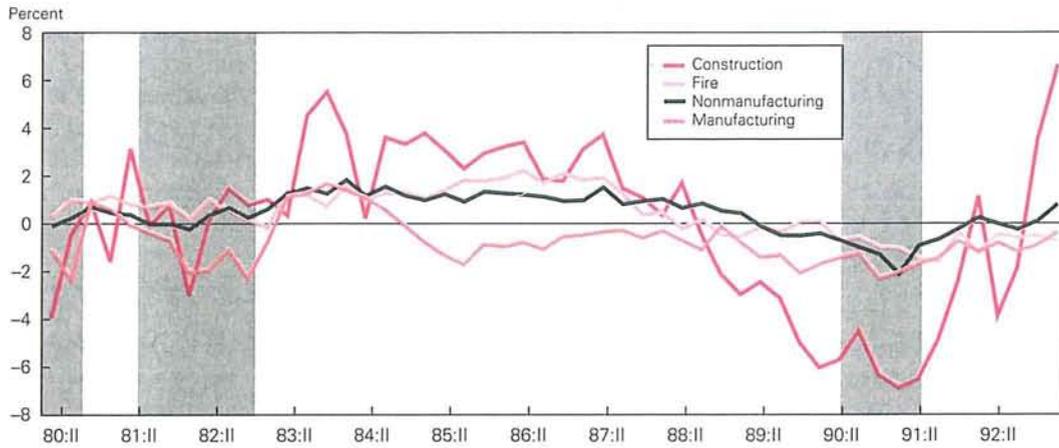
Can the duration and severity of the effects of this recession in New England account for the region's high rate of business failures? That is, can cyclical economic variables explain most of the increase in business failures? To answer this question, the study regressed the New England business failure rate on three lagged values of the rate of growth in payroll employment in New England (column 1 in Table 1, below). The business failure rate predicted by this regression is compared with the actual failure rate in Figure 4. The business failure rate is overpredicted in the 1975 and 1982 recessions and substantially underpredicted for the past three years. This suggests that additional factors, not captured by the employment series alone, may be needed to explain the recent extremely high rate of business failures in New England.

III. Industrial Composition of Business Failures

Not only did New England experience economic difficulties as a result of the nationwide recession, but the region also suffered from a substantial decline in real estate prices. This particularly affected industries directly related to real estate, such as construction.

Figure 5

New England Unemployment Growth, by Industry



Source: U.S. Bureau of Labor Statistics.

Growth rates for payroll employment by major industry grouping in New England are shown in Figure 5. While construction accounted for only 3 percent of nonfarm employment in New England at the end of 1992, it has shown great volatility over the past decade. During the early and mid 1980s, construction employment grew more rapidly than employment in other New England industries. After the sharp drop in real estate prices, construction employment decreased sharply and continued to drop for an extended period. By 1989, most other industries also exhibited decreases in employment, which persisted over the following two years. (One exception to this pattern is the much earlier decline in manufacturing employment, which began in 1984 and continues to the present.) Thus, the decline in New England employment associated with the most recent recession was spread across all industries, with only the decrease in the construction industry standing out.

Figure 6 shows the pattern of New England business failures starting in 1984, when Dun & Bradstreet first began publishing regional data on failures by industry. While the construction industry does have the highest failure rate, it is not dramatically higher than those in other industries. The similarity of failure rates across industries may reflect the ability of some industries to reduce their labor force to

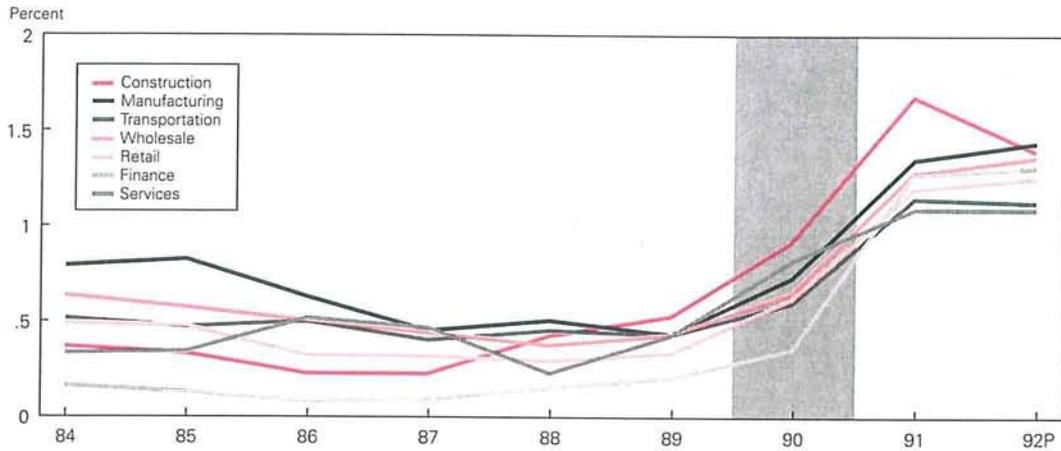
prevent, or at least delay, failure. For example, if construction firms can react to a severe downturn by relying on skeleton crews until conditions improve, the firms may not fail even though construction employment declines dramatically. In addition, firms in highly cyclical industries may structure themselves so as to reduce the probability of firm failure over a typical business cycle, for example, by being better capitalized.⁹

The severe decline in real estate prices may have affected most types of businesses, rather than simply those directly related to real estate, because of the general dependence on real estate to collateralize loans. Much business financing is asset based, and a general decline in real estate prices reduces the value of collateral, making it more difficult for all businesses to obtain new financing and perhaps even to retain credit lines already in place. If businesses in noncyclical industries had assumed in their long-term financial planning that nominal prices of collateral would remain constant or grow, decreases in the

⁹ In addition to the ways a firm might structure its finances, it could also structure labor contracts, supplier agreements, proportions of fixed versus variable costs, and lease versus ownership decisions to give the firm the maximum flexibility during an economic downturn.

Figure 6

New England Business Failure Rate, by Industry



Source: Dun & Bradstreet Corporation.

amount of available collateral could place a severe strain on the firm. Thus, while the failure rate is not concentrated in any particular industry, the extent of business failures still may be tied to credit availability.

IV. Credit Availability and Business Failures

Business failures among loan customers cause severe problems for banks, reducing loan loss reserves and, usually, bank capital as banks replenish their depleted loan loss reserves. Thus, business failures would contribute to subsequent bank failures. It is possible, however, that the causation could run in the opposite direction as well, with lender problems being transmitted to borrowers. To the extent that banks with depleted capital reduce or deny credit to borrowers reliant on banks for financing, these credit availability problems might be expected to lead to more business failures.

Much attention has been focused recently on whether problems with credit availability may be thwarting the economic recovery. A number of recent studies have found that banks whose capital has become depleted have reduced their holdings of loans.¹⁰ Of particular relevance is the evidence that

bank capital problems in the New England region have been widespread and particularly severe. Furthermore, Peek and Rosengren (1993b) have shown that, as a consequence of signing regulatory agreements that require them to improve bank capital ratios, New England banks have reduced lending to bank-dependent borrowers such as small and medium-sized businesses.

While reducing loans to satisfy capital requirements at one particular bank can disrupt historical lending relationships, the disruptions should be short-lived so long as some well-capitalized banks are available as lending alternatives. If, however, the capital problems in a region are widespread, as was the case in New England, no immediate alternative source of funds may be available. This is particularly true for small and medium-sized businesses that are not large enough to be customers either of large banks outside the region or of nonbank lenders such as insurance companies or pension funds, and not large enough to access capital markets directly (Gertler and Gilchrist 1993; Elliehausen and Wolken 1990).

Banks play a critical role in financing small businesses. Through their long-term relationship, a bank

¹⁰ See, for example, Hancock and Wilcox (1992), Baer and McElravey (1992), and Peek and Rosengren (1993a, 1993b, 1993c).

and a firm develop specialized knowledge about each other's operations. If this relationship is severed, other intermediaries without this specialized knowledge may be reluctant to provide loans to a firm under the same conditions as its previous lender. This is particularly true in situations where both businesses and banks are failing. A potential lender may be unsure whether it is the financial difficulties of the borrower or of the previous lender that caused the borrower to search for a new lender. Thus, for a

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bank-dependent borrower, the failure or shrinkage of its primary lender can cause financial distress and even financial collapse associated with the problems of the lender rather than problems of the borrower.

Because the direction of causation between bank failures and business failures may run both ways, attributing causation may be problematic. The timing of the effect is further complicated because troubled banks typically reduce loans well before the bank becomes insolvent (Peek and Rosengren 1993b) and because banks have often been closed well after the point of insolvency (Brumbaugh and Litan 1991). A contemporaneous effect of bank failures on business failures, as well as a lagged effect, can be taken as being consistent with the hypothesis that restricted bank lending contributes to business failures. Thus, financial variables that capture problems in the banking sector that are transmitted to the business sector could help explain the unusually high rate of business failures in New England.

Several variables could serve as proxies for banking problems that may be transmitted to the business sector. The bank failure rate can indicate banking problems so severe that they result in failure, severing the traditional lending relationship a borrower had with the bank. Another proxy for banking problems is a decrease in lending. If banks are calling loans or reducing credit availability, outstanding

loans decrease. Such decreases in loans may occur when banking problems are causing banks to re-trench, even though they are not so severe as to cause bank failures. Of course, one difficulty with using decreases in loans as a proxy for banking problems is that demand as well as supply disturbances can account for decreases in loans outstanding. Other variables tied to the performance of the loan portfolio, such as loan loss provisions, could also serve as appropriate indicators of bank problems. However, they are available only since 1984, not a long enough time series to be of use for this study.

Table 1 provides the results of including financial variables in regressions explaining the New England business failure rate. The base estimation period is 1960 to 1992, using annual data. The beginning date is limited by the availability of regional data on employment growth. The availability of published regional business failure rates limits the analysis to annual observations.

The first column of Table 1 reports the results of regressing the business failure rate on three lagged values of the nonfarm employment growth rate, the equation used to construct Figure 4.¹¹ Only the first lagged value makes a statistically significant contribution to the explanation of the business failure rate. However, the equation suffers from serial correlation of the error term. The second column adds the lagged value of the dependent variable. Now, the hypothesis of no serial correlation in the error term can no longer be rejected. The fit of the equation improves substantially, but the size of the effect of the first lagged value of the employment growth rate is halved, although it is still significant at the 5 percent confidence level. Alternatively, if the equation in column 1 is reestimated using a specification incorporating a first-order autoregressive correction, similar results for the significance of employment growth rates are obtained.¹² Thus, the evidence indicates that employment growth rates do make a contribution to the explanation of the variation in New England business failure rates.

The third column of Table 1 adds the contempo-

¹¹ Here, and in later regressions, the initial regression contains three lagged values of an explanatory variable and, if the third lagged value has an estimated coefficient exceeding its estimated standard error, includes additional lags as long as the associated estimated coefficient exceeds its estimated standard error (that is, contributes to a reduction in the equation's standard error).

¹² The other equations in the table were also reestimated with a first-order autoregressive correction. In each instance, the results were quite similar (and conclusions identical) to those obtained from the specification including a lagged dependent variable.

Table 1
Determinants of the New England Business Failure Rate
 Period: Annual Data, 1960 to 1992

Estimation Method	(1) OLS	(2) OLS	(3) OLS	(4) ^a TOLS	(5) ^a OLS	(6) OLS
<i>Explanatory Variables</i>						
Constant	.589** (.044)	.134 (.103)	.163* (.086)	.177 (.105)	.148 (.112)	.141* (.073)
Business Failure Rate (-1)		.842*** (.180)	.631*** (.179)	.573** (.219)	.872*** (.186)	.652*** (.166)
Employment Growth (-1)	-.0562*** (.0131)	-.0261** (.0118)	-.0061 (.0081)	-.0028 (.0106)	-.0001 (.0164)	
Employment Growth (-2)	-.0039 (.0143)	.0076 (.0112)	.0033 (.0073)	.0037 (.0103)	.0027 (.0157)	
Employment Growth (-3)	-.0199 (.0144)	-.0075 (.0113)	-.0039 (.0074)	-.0024 (.0105)	-.0084 (.0161)	
Bank Failure Rate			.077*** (.014)	.095*** (.028)		.079*** (.013)
Bank Failure Rate (-1)			.014 (.042)	.011 (.048)		.017 (.038)
Bank Failure Rate (-2)			-.304 (.181)	-.316 (.213)		-.320* (.165)
Bank Failure Rate (-3)			.443** (.209)	.422 (.250)		.466** (.193)
Bank Failure Rate (-4)			-.299 (.233)	-.466 (.347)		-.295 (.213)
Loan Growth (-1)					-.0124** (.0045)	
Loan Growth (-2)					.0069 (.0058)	
Loan Growth (-3)					-.0009 (.0051)	
R ²	0.465	.701	.903	.898	.784	.900
S.E.E.	0.156	.119	.074	.084	.116	.071
Durbin Watson	0.844					
Durbin-h		b	b	b	b	1.73

Notes: OLS = ordinary least squares; TOLS = two-stage least squares. Standard errors in parentheses.

^aBecause earlier loan data were unavailable, the estimation period is limited to 1964-1992.

^bThe Durbin-h test statistic could not be calculated. Using Durbin's suggested alternative test, the hypothesis of no serially correlated errors can be rejected at the 5 percent confidence level.

* significant at the 10% confidence level

**significant at the 5% confidence level

***significant at the 1% confidence level

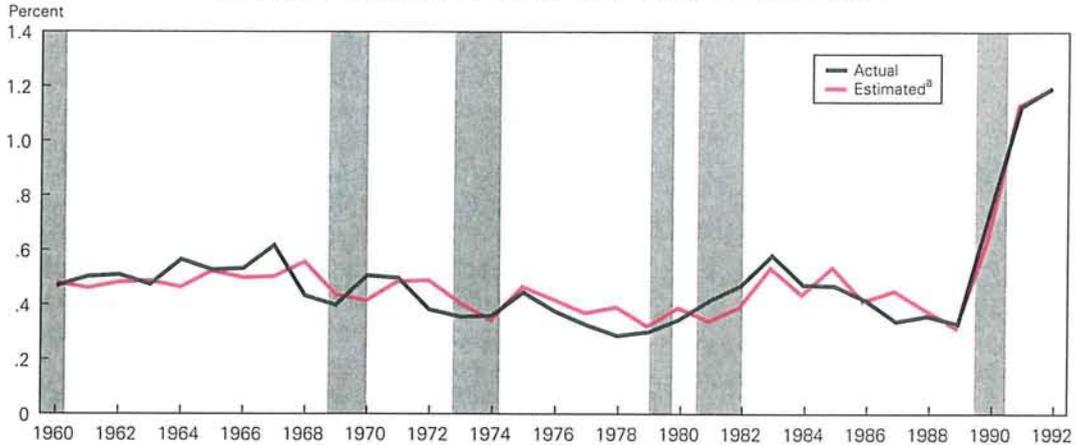
aneous and four lagged values of the New England bank failure rate to the variables included in column 2. The bank failure rate is that for FDIC-insured institutions (both commercial and savings banks), taken from the annual reports of the Federal Deposit Insurance Corporation. Lagged values as well as contemporaneous bank failure rates are included, because bank failures frequently lag bank insolvency, as described above. The contemporaneous and third lagged values of the bank failure rate each have estimated coefficients that are positive and statistically significant at the 5 percent or better confidence

level. With the addition of the bank failure rates, none of the three lagged values of the employment growth rate has an estimated coefficient as large as its estimated standard error, indicating that financial difficulties rather than slow employment growth best describe the business failure rate.¹³

¹³ Including additional lagged values of the business failure rate does not alter the general results. When Granger-causality tests were run with three or four lagged values, the hypothesis that the business failure rate is not Granger-caused by the bank failure rate could be rejected at the 5 percent confidence level.

Figure 7

*Actual Business Failure Rate in New England
and the Estimated Rate Based on Bank Failure Data*



a) Based on regressions using contemporary and lagged values of the bank failure rate.
Source: Dun & Bradstreet Corporation (actual data).

Given the use of annual rather than quarterly data, including the contemporaneous bank failure rate as an explanatory variable might present a simultaneity problem. For this reason, the column 3 regression was reestimated using a two-stage least squares procedure. Four lagged values of the bank failure rate, and three lagged values each of the bank loan growth rate, the business failure rate, and the employment growth rate, are used as the instruments for the contemporaneous value of the bank failure rate. Because the rate of loan growth is available only from 1961, the estimation period is now restricted to 1964 to 1992. The two-stage least squares results in column 4 are very similar to the results in column 3. Although the estimated coefficient on the third lagged value of the bank failure rate is no longer statistically significant, the contemporaneous value remains significant at the 1 percent confidence level. In addition, the coefficients on lagged employment growth rates remain insignificant.¹⁴ Thus, it does not appear that the explanatory value of the bank failure rate can be attributed to simultaneity bias.

An alternative specification to test for the effect of bank problems on business failure rates replaces the bank failure rate with the growth rate for bank loans. Loan growth rates should capture problems

with loan supply that occur even when banking problems are not so severe as to cause bank failures. As noted earlier, this variable has its own problems with respect to differentiating the separate influences of the supply of and the demand for loans. However, to the extent declines in loan growth precede increases in business failure rates, the evidence is consistent with the hypothesis that the availability of bank credit affects the business failure rate. The results in column 5 indicate that the first lagged value of the bank loan growth rate variable does make a statistically significant contribution (with the expected negative sign) to the explanation of the business failure rate.¹⁵ Again, the employment growth rate variables are not significant.

Because the employment growth rate variables are dominated by the bank failure rate (and the bank loan growth rate) variables, the final column in Table 1 shows the results when the column 3 specification is reestimated omitting the employment growth rate

¹⁴ Even if the contemporaneous value of the bank failure rate is omitted, the coefficients on the lagged employment growth rate remain insignificant.

¹⁵ Other lending categories, such as real estate loans (excluding one- to four-family residences) and commercial and industrial loans tell much the same story, although their explanatory power is not as great as that of total loans.

variables. Now the second and third lagged values of the bank failure rate, as well as the contemporaneous value, are statistically significant.¹⁶ Figure 7 shows the actual business failure rate and the fitted failure rate based on the column 6 estimates. The fit is a substantial improvement over that obtained when

Problems in the banking sector help explain the recent unusually high business failure rates in New England.

only lagged employment growth rates (column 1) are included in the equation, as in Figure 4. While fitted equations using only employment growth rates as explanatory variables substantially underestimate the failure rate for the past three years, the regression using financial variables fits the recent failure rate quite well. Thus, problems in the banking sector do help explain the recent unusually high business failure rates in New England.

References

- Baer, Herbert and John McElravey. 1992. "Capital Adequacy and the Growth of U.S. Banks." In Charles Stone Ziffus, ed., *Risk Based Capital Regulation: Asset Management and Funding Strategies*. Homewood IL: Dow-Jones Irwin.
- Bradley, Michael and Michael Rosenzweig. 1992. "The Untenable Case for Chapter 11." *The Yale Law Journal*, vol. 101, pp. 1043-95.
- Brumbaugh, Dan R., Jr. and Robert E. Litan. 1991. "Ignoring Economics in Dealing with the Savings and Loan and Commercial Banking Crisis." *Contemporary Policy Issues*, vol. IX, January, pp. 36-53.
- Dun & Bradstreet Corporation, *Business Failure Record*, annual issues.
- Elliehausen, Gregory E. and John D. Wolken. 1990. "Banking Markets and the Use of Financial Services by Small and Medium-Sized Businesses." Staff Studies no. 160, Board of Governors of the Federal Reserve System, September.
- Federal Deposit Insurance Corporation. Various years. *Annual Report of the Federal Deposit Insurance Corporation*, Washington, D.C.: FDIC.
- Flynn, Ed. 1989. "Statistical Analysis of Chapter 11." Manuscript, Administrative Office of the United States Courts, October.
- Gertler, Mark and Simon Gilchrist. 1993. "Monetary Policy, Business Cycles and the Behavior of Small Manufacturing Firms." Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series no. 93-4, February.
- Hancock, Diana and James A. Wilcox. 1992. "The Effects on Bank Assets of Business Conditions and Capital Shortfalls." In *Credit Markets in Transition*, Proceedings of the 28th Annual Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, May, pp. 502-20.
- Peek, Joe and Eric S. Rosengren. 1993a. "Bank Real Estate Lending and the New England Capital Crunch." *AREUEA Journal*, forthcoming.
- _____. 1993b. "Bank Regulation and the Credit Crunch." Presented at the American Economic Association Annual Meetings, Anaheim, CA, January.
- _____. 1993c. "The Capital Crunch: Neither a Borrower Nor a Lender Be." *Journal of Money, Credit, and Banking*, forthcoming.

V. Conclusion

The business failure rate in New England over the past three years has been dramatically higher than it was during the two previous recessions. While New England has been severely affected by this last recession, neither employment variables nor the industrial concentration of failures can explain its high rate of business failures. One hypothesis consistent with the high failure rate is that business problems in New England have been magnified by problems in the banking industry. Statistical evidence supports the view that the business failure rate has been associated with the bank failure rate and decreases in lending. To the extent that firms rely on local banks to provide financing, small and medium-sized firms denied credit by their banks may have no alternative to failing. As New England banks recapitalize, however, they can be expected to be more aggressive in seeking new borrowers, and their efforts may help reduce the business failure rate in the future.

¹⁶ To answer concerns about the possible endogeneity of contemporaneous bank failures, one can either run two-stage least squares or omit the contemporaneous value of the bank failure rate. In the former case, the contemporaneous, second, and third lagged values of the bank failure rates remain significant at the same confidence levels. In the latter case, the third and fourth lagged values of the bank failure rate are significant at the 5 percent confidence level.

Input Tariffs as a Way to Deal with Dumping

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The General Agreement on Tariffs and Trade (GATT) has significantly reduced the use of tariffs as barriers to international trade in today's marketplace. The existence of antidumping legislation, however, provides American industry with a method of procuring protection when the pressures of international competition become oppressive. Many American companies have taken advantage of the legislation and claimed injury at the hands of unfair competition from abroad, often winning the imposition of punitive duties on competing imports as compensation for previous underpricing.

The international trade literature has produced many models of dumping, providing thorough analyses of the effects of dumping and antidumping laws on both the foreign and domestic markets.¹ This article uses an analytical model developed in Skeath (1993) to explore in detail an intriguing antidumping case, initiated in mid-1990, involving flat-panel display screens for laptop computers. The vertical relationships between laptop screen and laptop computer producers make the results of the analysis applicable to a wide variety of international industries with vertically integrated or vertically related firms.² The analysis is used to show the consequences of antidumping duties for both intermediate and final good producers in the laptop computer industry. In particular, examination of the behavior of consumers and producers in response to an input tariff offers insight into the rationale behind the recent request on the part of the protected industry for repeal of the tariff.

A Specific Case of Dumping and Input Tariffs

The relatively recent, and divisive, case in question involved producers of display screens for laptop computers. Following a complaint filed by a group of American producers of flat-panel computer

display screens calling themselves the Advanced Display Manufacturers of America (ADMA), in August of 1991 the United States Department of Commerce and the International Trade Commission imposed a 63 percent tariff on imports of Japanese active matrix liquid crystal displays. While the ADMA had hoped for substantial duties on three other types of flat-panel displays as well, they claimed the ITC's final decision as a victory and as an essential element in guaranteeing the survival of the American display screen industry.³

Antidumping regulations were originally designed to protect American manufacturers such as the display producers from foreign manufacturers practicing predatory pricing (that is, selling their goods in the U.S. market at a price below the average cost of production) or price discrimination (pricing abroad at a level below their domestic price); such practices are often referred to as "unfair trade practices." Under the antidumping laws, duties can be levied on imports if the dumping is found to cause injury to an American industry. Rulings follow a two-step process: The Commerce Department's International Trade Administration must first find that dumping has occurred and then the International Trade Commission (ITC) must determine that injury has also occurred. If both investigations find evidence of dumping, punitive duty levels are determined based on manufacturing cost levels.

The duties imposed on active matrix liquid crystal displays in August 1991 followed preliminary and final rulings by both the Commerce Department and the ITC that described Japanese firms as pricing below fair value. The final official dumping margin for the active matrix display was calculated at 62.67 percent, despite preliminary findings that put the margin well below 10 percent. As noted above, the American display manufacturers considered the final tariff decision to be an important victory as well as a crucial ingredient in guaranteeing the long-term viability of their industry.

The computer manufacturing industry, however, felt differently about the punitive duties. Members of that industry had consistently and vociferously argued that the American display screen industry did not produce screens of high enough quality or in great enough quantity to meet their needs; thus, the imposition of dumping duties promised merely to increase the price of their products that required the taxed screens as inputs. After the imposition of the tariff, an IBM spokesperson was quoted noting that the decision was, "in effect, an eviction

notice from the U.S. government to the fastest growing part of the U.S. computer industry."⁴ Within a few months, Japanese screen manufacturers were suspending exports of the taxed displays to the United States and moving their computer production and assembly facilities out of the United States back to Japan.⁵ Apple Computer was considering moving its portable computer production plants to Singapore or Ireland, and both Compaq and IBM were threatening similar moves of their laptop production facilities to off-shore locations.⁶

The reactions of the major computer manufacturers in response to the imposition of tariffs implied that the antidumping duties would do more to hurt the computer industry than they would do to help screen producers to compete with their Japanese rivals. Although the ADMA claimed that the duties would enhance the viability of the U.S. laptop screen industry, other sources claimed that a lack of investment in the newest technologies was responsible for the U.S. screen producers lagging behind their Japa-

¹ The standard treatment of dumping as price discrimination on the part of a foreign monopolist can be found in most international economics texts. This analysis presents dumping as profit-maximizing behavior by the foreign firm but shows its potentially welfare-decreasing effects on the domestic market. More recent theory can be found in Ethier (1982), Das and Mohanty (1984) and Dixit (1988). Brander and Krugman (1983) connect the existence of intra-industry trade to the phenomenon of "reciprocal dumping"; see also Helpman and Krugman (1989). On the subject of the role of antidumping laws in affecting the behavior of domestic and foreign firms, see Webb (1987, 1992) and Herander and Schwartz (1984).

² The effects of trade policy in vertically related markets have been examined by Rodrik and Yoon (1989) as well as by Spencer and Jones (1991, 1992). These papers do not incorporate quality differentiation as does Skeath (1993).

³ The tariff on active matrix liquid crystal displays was set at 62.67 percent. A second group of flat-panel displays known as electroluminescent screens had a 7.02 percent duty imposed upon them. No duties were levied on the other two types of displays in question, passive matrix liquid crystal displays and displays that use a gas-plasma technology. Early Commerce Department investigations had suggested that the dumping margin was considerably smaller than was finally decided. See Farnsworth (1991), Fisher (1991), Lachica (1991a, 1991b), Pollack (1991a, 1991b), and Zachary (1991).

⁴ Spokesman Michael Dutton, for International Business Machines Corporation, quoted in *The New York Times*, 8/16/91 (Pollack 1991b).

⁵ The tariff applied to unassembled screens only and not to fully assembled computers. Thus, Japanese computer manufacturers who shipped complete machines to the United States could avoid paying the tariff. Japanese firms using imported screens to assemble machines in the United States were unable to avoid the tariff and were forced to move their facilities out of the United States. Presumably it was too costly for Japanese firms to move their screen production facilities into the United States.

⁶ See Sanger (1991a, 1991b) and *The Wall Street Journal* (1991a, 1991b).

nese counterparts in quality.⁷ In effect, these arguments implied that dumping was not to blame for the American manufacturers' inability to capture a significant share of the market. In addition, many were concerned that the economic cost of job losses associated with the movement of computer production locations abroad would significantly outweigh any benefits that would be reaped by the display producers. Even without such movement, the economic impact of projected price increases for laptop and notebook computers served to make computer manufacturers and consumers wary of the benefits of the duties.

A model for analyzing the effect of the display screen tariff must incorporate the industry's vertical relationship with the computer industry and the presence of product differentiation based on quality.

Similar concerns have been raised in relation to other antidumping duties that have been imposed on products used primarily as inputs into other manufactured goods. Duties on imported ball bearings, for instance, were recommended by the Commerce Department in 1989. These tariffs were as high as 212 percent on some types of ball bearings; their effect was to significantly increase production costs for a number of American manufacturers.⁸ Another recent tariff imposed on Canadian soft-wood products is said to threaten the U.S. housing and construction industry.

The most recent development in the display screen duty case was the Commerce Department's revoking of the punitive tariffs, at the request of "the sole remaining U.S. maker of the screens."⁹ The request, made in November 1992, was quickly granted; it was announced in January 1993 that the Commerce Department planned to revoke antidumping duties on the Japanese screens.¹⁰ Reports suggest that new ties to laptop producers influenced the display screen firm in its decision to request removal of the tariffs, although no direct evidence was presented from the firm itself regarding its rationale.

The case of the ADMA and active matrix liquid crystal displays illustrates the political-economic intricacies that can surround the creation of trade policy. It also highlights the fact that policies designed to benefit certain firms or industries may have other, just as significant, effects on other firms in other industries. Moreover, the model presented below will show that antidumping policies do not always have the anticipated effect even on the industries that they are designed to protect.

The Theoretical Model

An appropriate model for analyzing the effect of the display screen tariff must incorporate the most salient features of the industry's organization, notably its vertical relationship with the computer manufacturing industry and the presence of product differentiation, even among otherwise identical types of displays, based on quality. Further, it must allow for the imposition of trade (or domestic) policies that might affect the equilibrium outcome in the industry. The model presented in Skeath (1993) incorporates each of these characteristics;¹¹ the equilibria obtained from the model shed light on the manner in which actions of the display or computer producers may affect the welfare of the other producer. In addition, analysis of the equilibrium outcomes that arise following the imposition of (anti-dumping) tariffs indicates why the display manufac-

⁷ Richard Flasck, quoted in *The Wall Street Journal*, 2/11/91, had been a U.S. display manufacturer. He noted that "[t]he Japanese have invested billions into displays, while the U.S. hasn't made the investment. About the only thing [duties] will do is prevent the U.S. population from enjoying products using these displays." See Zachary (1991).

⁸ See Johnson (1992). Companies most affected by the ball bearing tariff include General Electric, Hewlett Packard and IBM.

⁹ See Nomani (1993). The sole U.S. producer of active matrix displays at the time of the request was Optical Imaging Systems, Inc., owned largely by Guardian Industries Corp. Other firms are mentioned as being in the process of creating prototype screens but not at the stage of producing for the general market. Bradsher (1992) reports OIS as the firm responsible for requesting the reversal of the tariffs, while Nomani identifies Guardian. Both make reference to business connections with Apple Computer as significant in the change of heart of the screen producers.

¹⁰ The official announcement of an end to the screen duty came on June 21, 1993. See Andrews (1993).

¹¹ The model described below and presented originally in Skeath (1993) draws on earlier work by Spencer and Jones (1991, 1992) and Rodrik and Yoon (1989) in its treatment of vertical relations and international trade. The demand side of the model has its roots in work by Chang and Kim (1989, 1991) and Chang and Chen (1992), while the industrial organization is similar to the model in Ronnen (1991).

turers may have had good reason to request that the duties be withdrawn.

The model of quality-differentiated intermediate goods begins with two countries (home and foreign), two firms producing final goods (F and F*), and two intermediate good firms (I and I*), foreign variables being indicated with a superscript *. Standard simplifying assumptions in the literature are that the quality of a critical input determines the quality of the final good it is used to produce and that a unit-for-unit correspondence exists between input and final good. Such assumptions may reasonably be argued to accurately describe the laptop computer industry, in which similarly priced machines with identical features (speed, memory size, and the like) are often distinguished by the quality of their display screens and in which each machine requires only a single display, regardless of its quality. Thus, this model assumes that one unit of intermediate good is required for the production of one unit of final good. In addition, it is quite realistic to assume that the foreign (that is, Japanese) screen firm produces the high-quality input (see Hart 1993). In the model described here, firm I* produces an input that can be used by either final good firm to produce a high-quality product; use of firm I's input results in the production of a low-quality final product.

Firm I*, the high-quality input producer, provides its input, at its marginal cost of c_H , to either final good firm.¹² Firm I, the low-quality input producer, incurs marginal costs of production of c_L and sells its input on the domestic market at a price of p_L ($\geq c_L$). The foreign firm always purchases its input from I*; the home firm can choose to purchase its input from either intermediate good firm. Under these assumptions, the foreign (here, Japanese) firm F* always provides a high-quality good to the market but the home (American) firm F may provide a good of either high or low quality. Costs for the final good firms are determined solely by the cost of the intermediate input.¹³ Thus, the final market equilibrium outcome depends crucially on which input is purchased by firm F and on the price paid for that input.

The demand side of the model consists of a set of consumers located along the interval $[0,1]$ who gain utility from consuming a single unit of the final good according to the quality of that unit; each consumer maximizes utility. Consumers have different tastes for quality depending on their location on the interval and are identified according to their position along that interval, or according to their type, T , $0 < T < 1$. A consumer located at position T (also referred to as a

consumer of type T) who purchases one unit of the final good of quality q_H (high-quality) or q_L (low-quality), at price P_H or P_L , gets utility of $U_H(T) = q_H \cdot T - P_H$ if she purchases the high-quality good and utility of $U_L(T) = q_L \cdot T - P_L$ if she purchases the low-quality good. Given that the consumers get zero utility if they make no purchase, it follows that a consumer will purchase a specific quality good if and only if her utility from the purchase of that good is greater than her utility from the purchase of the other quality good.¹⁴ The marginal consumer who is indifferent between the purchase of a high-quality good and no good at all is the consumer who is located at $T_H = P_H/q_H$, where T_H solves $U_H(T_H) = 0$. The marginal consumer who is indifferent between purchasing the low-quality good and no good at all is similarly defined to be located at $T_L = P_L/q_L$, where T_L solves $U_L(T_L) = 0$. Consumers to the left of T_H , those located at $T < T_H$, are not willing to purchase the high-quality good because they receive negative utility from such a purchase while those to the right of T_H , those located at $T > T_H$, are willing to buy the high-quality good because it provides them with a positive amount of utility. The same is true for consumers to the left and right of T_L . The marginal consumer indifferent between a high-quality and a low-quality good, consumer T_z , has $U_H(T_z) = U_L(T_z)$. A consumer located to the left of T_z , one with $T < T_z$, receives greater utility from purchasing the low-quality good than from purchasing the high-quality good while a consumer located to the right of T_z , one with $T > T_z$, receives greater utility from purchasing the high-quality good.

The parameters T_L and T_H , which show the locations of the marginal consumers of low- and

¹² Provision of the input at marginal cost to the foreign firm may be justified by assuming that a vertical relationship exists between the two firms. In the case of vertically integrated firms, firm F* would always be able to obtain the input from I* at cost. To explain provision of the input at marginal cost to the domestic firm, however, the original model assumes the existence of numerous competing producers of the input in the foreign country. The existence of competition for the input producer in the foreign country is based in fact; there are significantly larger numbers of flat-panel display producers in Japan than there are in the United States. See Hart (1993).

¹³ Since the quality of the input determines the quality of the final product, it is safe to assume that any cost variations in production of the final good come solely from variations in the price paid for the input.

¹⁴ Clearly, consumers only purchase a good if it provides strictly positive utility as well. In the event of a tie, if the utility level received from purchasing the high-quality good is the same as the utility level received from purchasing the low-quality good ($U_H(T) = U_L(T)$), consumer T is assumed to purchase the high-quality good.

high-quality goods, also identify the quality-deflated prices that are offered for a unit of a good of low or high quality. In order to simplify the analytics of the model, all equilibrium values are expressed in such quality-deflated terms. Thus, $\gamma_H = c_H/q_H$ is the quality-deflated marginal cost of producing the high-quality input, $\gamma_L = c_L/q_L$ is the quality-deflated marginal cost of producing the low-quality input, and $\rho_L = p_L/q_L$ is the quality-deflated price charged by firm I for the low-quality input. The relative quality level of output is defined as $k = q_H/q_L$.

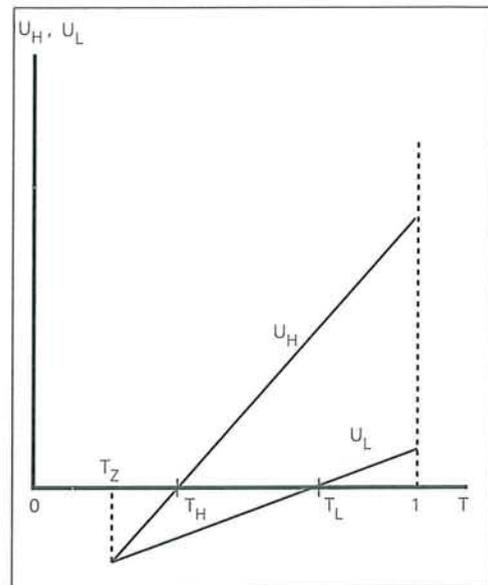
The final market equilibrium is attained in two stages. In Stage 1, input producers set their prices. Because it is assumed that firm I* prices at marginal cost, the only real decision made in Stage 1 is that of firm I in setting p_L . In Stage 2, the final good producers purchase inputs and compete in a non-cooperative price-setting game; only the domestic firm, F, has a choice of inputs in Stage 2. In the second stage, then, firms F and F* set prices P_L and P_H which determine the quality-deflated values T_L , T_H , and T_z which, in turn, determine the pattern of consumption in the market. Solving for the final equilibrium is achieved via backward induction, first finding all of the possible Stage 2 pricing outcomes and then determining the price that will be set by firm I in Stage 1.

Three outcomes are possible in Stage 2. Consumers might purchase only the high-quality good, or they might purchase some of each quality, or they might purchase only the low-quality good, depending on the relative sizes of T_L , T_H , and T_z . Figures 1, 2, and 3 show the three possible ways in which T_L , T_H , and T_z might be related to each other.¹⁵ In each figure, the locations of consumers (T) are shown on the horizontal axis and utility levels (U) are shown on the vertical axis. The lines illustrated are $U_H(T) = q_H \cdot T - P_H$ and $U_L(T) = q_L \cdot T - P_L$, plotting the utility associated with purchasing the high- and low-quality goods for each consumer (that is, each value of T) along the horizontal axis. The slope of each line is determined by the quality level of the good whose utility is measured by the line; thus, the U_H line is more steeply sloped than the U_L line because $q_H > q_L$.

In Figure 1, $T_H < T_L$, which guarantees that $T_z < T_H < T_L < 1$. In this case, all consumers located at $T > T_H$ find that the high-quality good provides them with more utility than the low-quality good while all consumers located at $T < T_H$ find that they receive negative utility if they purchase either quality good. Accordingly, all consumers between T_H and 1 pur-

Figure 1

Market Share Determination
 $T_z < T_H < T_L < 1$



Consumers from 0 to T_H purchase neither good.

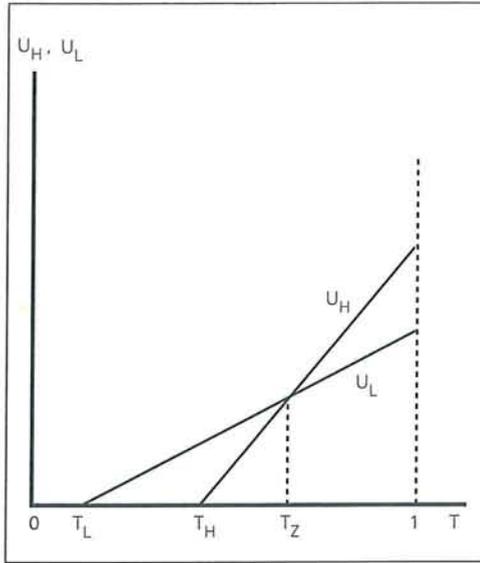
Consumers from T_H to 1 purchase the high-quality good.

chase the high-quality good but no consumers choose to purchase the low-quality good. In Figure 2, $T_L < T_H < T_z < 1$. Thus, consumers located at $T < T_L$ choose to purchase neither good because they would receive negative utility from a purchase, consumers located between T_L and T_z purchase the low-quality good because it offers them higher utility than does the high-quality good, and consumers between T_z and 1 purchase the high-quality good because it offers them the highest utility level. In Figure 3, $T_L < T_H < 1 < T_z$. In this case, consumers located between 0 and T_L buy neither good while consumers located between T_L and 1 purchase the low-quality good because it offers greater utility than the high-quality good. No consumers purchase the high-quality good. Market shares (that is, the number of consumers buying each quality, or the number of units sold) for

¹⁵ These figures are essentially equivalent to ones presented by Chang and Kim (1989, 1991) because the demand side of the model is based on their work.

Figure 2

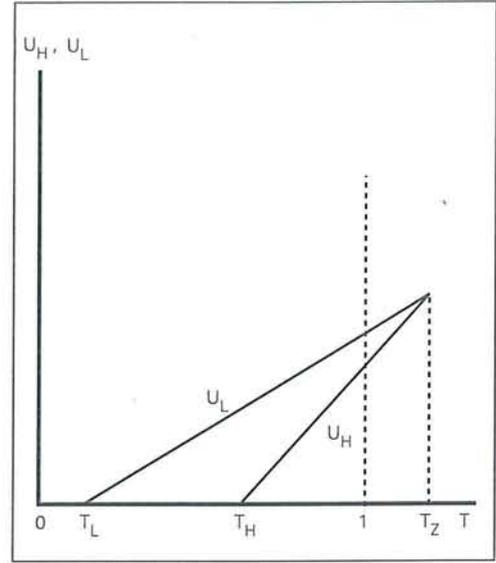
Market Share Determination
 $T_L < T_H < T_Z < 1$



Consumers between 0 and T_L purchase neither good.
 Consumers between T_L and T_Z purchase the low-quality good.
 Consumers between T_Z and 1 purchase the high-quality good.

Figure 3

Market Share Determination
 $T_L < T_H < 1 < T_Z$



Consumers between 0 and T_L purchase neither good.
 Consumers between T_L and 1 purchase the low-quality good.

the low-quality producer are 0, $T_Z - T_L$, and $1 - T_L$, in Figures 1, 2, and 3, respectively, and market shares for the high-quality producer are $1 - T_H$, $1 - T_Z$, and 0, respectively.

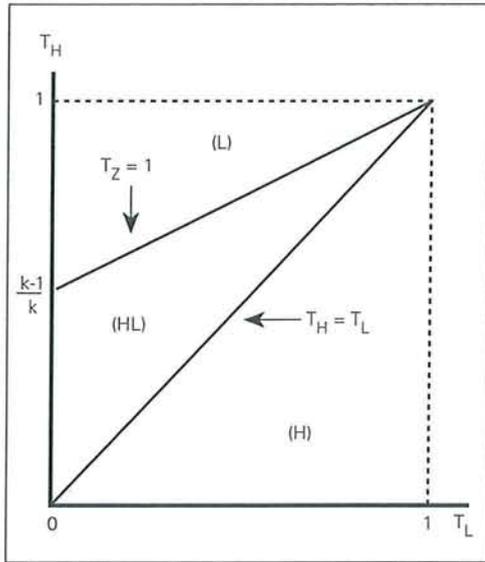
The market share results can be summarized by noting their dependence on the size of T_H relative to T_L and on the size of T_Z relative to 1. When $T_H < T_L$, only high-quality goods are demanded. When $T_H > T_L$, both qualities or only low quality may be demanded, depending on whether $T_Z < 1$ or not. If $T_H > T_L$ and $T_Z < 1$, both qualities are demanded, while if $T_H > T_L$ and $T_Z > 1$, only low quality is demanded. These three possibilities are shown together in a single diagram in Figure 4. This figure shows the (T_L, T_H) space divided into three distinct areas by the lines $T_H = T_L$ and $T_Z = 1$. The area labeled (H) includes all T_L and T_H combinations for which only high quality is demanded (including those T_L and T_H combinations on the $T_H = T_L$ line). In area (H), both firms F and F* produce and sell high quality; they compete in an identical product duopoly. Area (HL)

includes combinations of T_L and T_H for which both qualities are demanded. In this area, F produces and sells low-quality goods while F* produces and sells high-quality goods. Area (L) includes those remaining combinations of T_L and T_H for which only low quality is demanded (which includes the T_H and T_L combinations on the $T_Z = 1$ line). In area (L), F produces and sells low quality but F* sells nothing because it can only produce the high-quality good for which there is no demand. Market share outcomes in areas (H), (HL), and (L) correspond exactly to the share outcomes derived from Figures 1, 2, and 3, respectively.

Once market share outcomes are known, firms F and F* can determine their optimal prices, each firm's best response to the price of the other firm. Firms determine their optimal prices by considering the market area in which different price combinations lie and by considering the profits that they could earn in each case. Profits in area (H) are zero for each firm because they both produce high-quality goods in this

Figure 4

Equilibrium Market Regimes



In area H, $T_H < T_L$ and $T_Z < 1$.
 In area HL, $T_H > T_L$ and $T_Z < 1$.
 In area L, $T_H > T_L$ and $T_Z > 1$.

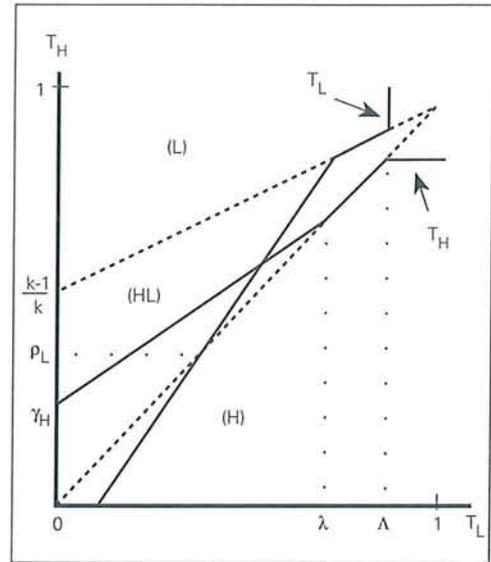
area; firms choose price in this model (rather than quantity), so the equilibrium when they both produce the high-quality product entails each setting price at marginal cost ($P_H = c_H$ or $T_H = \gamma_H$).¹⁶ In the other areas shown in Figure 4, profits are determined as the product of the number of units sold (market share) multiplied by per unit profit (price minus cost). Knowing its profit potential, each firm chooses price to maximize profits given the price chosen by the other firm.

The profit-maximizing prices set by each firm in Stage 2 can be illustrated using best-response functions (reaction functions) for each firm. The reaction functions, which are upward-sloping but not continuously differentiable, as in Ronnen (1992), show each firm's best price response to its rival's choice of price. In other words, if the foreign firm

¹⁶ This equilibrium is the (unique) Bertrand pricing equilibrium for the game described by this model. Zero profits in this context means that no profits are earned beyond a normal rate of return.

Figure 5

Price Reaction Functions



decides on a price of T_H , the domestic firm's best response function shows the price, T_L , that maximizes firm F's profits in response to T_H . The reaction functions are illustrated in Figure 5, which uses the same axes as those in Figure 4.¹⁷ As is clear from an inspection of the two reaction functions in Figure 5, there is a single intersection of the two functions. Thus, a unique, quality-deflated price equilibrium can be determined for any given values of the model's parameters, k , γ_H , and ρ_L .¹⁸

An important feature of the reaction functions, $T_L(T_H, \rho_L)$ and $T_H(T_L, \gamma_H)$, is their non-differentiability

¹⁷ The T_H reaction function depends on k and γ_H while the T_L reaction function depends on k and ρ_L . Full equations for the reaction functions can be found in Skeath (1993). In the discussion that follows, note that k and γ_H are fixed but that ρ_L is endogenous, since it is chosen in Stage 1 by firm I.

¹⁸ The equilibrium must entail T_L and T_H being less than one in order to guarantee that the firms can sell their products to the consumers in the domestic market. As long as $k \geq 1$, $\gamma_H < 1$, and $\rho_L < 1$, both T_H and T_L will be strictly less than one in equilibrium. These parameter restrictions are assumed to hold.

ity. The kinks in the reaction functions are caused by the interrelationships of T_L and T_H in determining which products are purchased in equilibrium. Consumers decide whether to purchase the low- or high-quality product based on the relative positions of T_L , T_H , and T_z as discussed above. It follows that the location of the kinks is closely related to the location of the areas (H), (HL), and (L) in Figure 4. More generally, this means that the manner in which a firm responds to a given choice of T by its rival is different when that T is high than when it is low.

Consider the foreign firm's reaction function, $T_H(T_L, \gamma_H)$, in Figure 5. For relatively low values of T_L , F^* maximizes profit by choosing some $T_H > T_L$ in the (HL) area. As T_L rises, however, F^* finds it optimal to raise T_H by less than the increase in T_L in order to maintain its customer base and to continue maximizing profits. (Because F^* responds to increases in T_L with smaller increases in T_H , the slope of its reaction function in the (HL) area is less steep than the line $T_H = T_L$.) Once T_L reaches the critical value, λ , F^* 's optimal T_H puts its reaction function onto the $T_H = T_L$ line and into the (H) area in which consumers purchase only the high-quality product.¹⁹ The foreign firm can exactly match any increase in T_L beyond λ with an increase in T_H without moving away from the (H) area, without losing customers; thus, the T_H reaction function lies along the $T_H = T_L$ line for T_L above λ . Finally, once T_L is so large that it lies beyond a second critical point, Λ , the foreign firm has no need to change its T_H at all in response to increasingly higher values of T_L . For $T_L > \Lambda$, F^* has no need to worry about its customer base as no consumers could be encouraged to purchase low quality at such a high price. This fact allows the T_H reaction function to be horizontal for large T_L values.

A similar explanation can be provided for the shape of the T_L reaction function. For low values of T_H , the domestic firm's profit-maximizing choice of T_L lies above T_H so that the T_L reaction function is in area (H). In this area, the domestic firm actually prefers to produce the high-quality good, so that its choice of T_L is not truly relevant until it is high enough that the reaction function enters the (HL) area.²⁰ Once T_H exceeds ρ_L , as shown in Figure 5, the T_L reaction function lies in area (HL). As T_H rises beyond this point, the domestic firm's optimal T_L rises more slowly than T_H , again as a way of preserving the size of the consumer group purchasing the low-quality good. Eventually, T_H becomes large enough that F 's optimal T_L hits the $T_z = 1$ line and the (L) area. For higher values of T_H , it is optimal for the

domestic firm to change T_L in such a way that the reaction function moves along the $T_z = 1$ line and stays just inside the (L) area. Once T_H becomes so large that consumers would no longer consider switching from low to high quality, there is no more need to change T_L at all in response to changes in T_H . The T_L reaction function becomes vertical in response to very high T_H values.

The price equilibrium in Stage 2 of this model is found by identifying the T_H and T_L values at the intersection of the two reaction functions. The specific position of each reaction function is determined by the costs incurred by each firm during production; the T_H reaction function position is determined by the value of γ_H and the T_L reaction function position is determined by the value of ρ_L . In this model, γ_H is fixed but ρ_L can be changed by firm I. Thus, firm I can control the ultimate pricing outcome by changing its ρ_L and moving the T_L reaction function left (for low ρ_L) or right (for high ρ_L).

For the equilibrium to occur in the (HL) area in Figure 5, ρ_L must be below the critical value λ . Equilibria in this area provide firm F with strictly positive profits because F 's market share ($T_z - T_L$) and unit profit ($T_L - \rho_L$) are both positive. When $\rho_L < \lambda$, then, the domestic input producer is able to sell its low-quality input to the domestic final good producer and remain in business. If ρ_L is higher than λ , the reaction functions intersect in the (H) area (either on or to the right of $T_H = T_L$), and no consumers purchase the low-quality good. In this case, firm I cannot stay in business because it cannot sell any of its product. It follows that if an equilibrium is to exist in which firm F purchases its input from I, then it must be the case that the reaction functions intersect in area (HL) and that $\rho_L < \lambda$.

Given these specifications of the equilibrium in Stage 2 of the game, it is possible to determine the action to be taken by firm I in Stage 1. Firm I desires to maximize its profits, subject to the constraint that those profits are non-negative and subject to the

¹⁹ The critical value, λ , can be determined using the reaction function equations. Here, $\lambda = (2k - 1)^{-1} [k(1 + \gamma_H) - 1]$. This is the critical value for the T_H reaction function at which the function changes slope the first time. The second critical value, at which the T_H reaction function changes slope the second time, is denoted below as Λ ; the actual value of Λ is $\frac{1}{2}(1 + \gamma_H)$.

²⁰ Technically, if the T_L reaction function lies within the (H) area, any T_L that satisfies $T_L \geq T_H$ may be chosen by the domestic firm. That is, in response to low values of T_H , if the optimal T_L would be at least as large as T_H , then it does not matter what actual T_L is chosen as long as it is some $T_L \geq T_H$, because the low-quality product will not be produced in equilibrium.

further constraint imposed on those profits by the Stage 2 equilibria. As shown above, firm I must charge $\rho_L < \lambda$ if it is to sell any of its product to firm F. Taking these constraints into account, the profit-maximizing, quality-deflated price for firm I is $\rho_L = \frac{1}{2}\gamma_L + \frac{1}{2}\lambda$. Firm I's profit-maximizing price will be below λ , and thus will guarantee an equilibrium in Stage 2 in area (HL), if (and only if) $\gamma_L < \lambda$. For values of $\gamma_L > \lambda$, the Stage 2 equilibrium occurs in area (H) and consists of a duopoly for firms F and F* in the high-quality good.

Effects of Dumping Duties

The theoretical model described above shows that the domestic low-quality input producer is unable to participate in the market when its quality-deflated marginal cost exceeds the critical value, λ . In such circumstances the input producer might be concerned that its foreign rival(s) were setting a price below the "fair (cost-based) value" of their own input in order to drive the domestic producer (whose prices were determined by cost) out of the market. Such a scenario is similar to the situation that occurred with the ADMA in 1990; their inability to penetrate the display screen market led them to believe that their rivals were dumping screens on the U.S. market. The ADMA argued to the Commerce Department and the ITC that punitive duties should be assessed on the foreign (Japanese) screens in order to level the playing field in the display screen industry. In the model being used here, such duties can be modeled as an increase in the selling price of the high-quality input in the domestic market; in other words, duties imposed to protest foreign dumping of the high-quality input raise the price of that input for the domestic final good firm.

The purpose of antidumping duties imposed by the domestic government is to encourage the use of domestic inputs by domestic final good manufacturers. Firm I has little benefit to gain unless it is in the position of being outside of the market before antidumping policy takes effect. In other words, one would expect such policy to be used only when the (no policy) market equilibrium consists of a high-quality duopoly between the domestic and foreign firms; one would expect such policy to be used only if the original equilibrium occurred in the (H) area in Figure 5. Unfortunately, the model described above can be used to show that the imposition of antidumping tariffs on the high-quality input cannot help

the domestic input producer to sell its product to firm F if it was unable to do so in the absence of the duties. This result helps considerably in understanding the rationale for the U.S. firm's recent request to rescind the display screen tariffs.

To see that the display screen duty can do little to help domestic producers of the input in the model above, consider the effect of a (quality-deflated) tariff imposed on the high-quality input, t_1 . Such a tariff serves to increase firm F's costs of producing the high-quality final good by increasing the cost of the critical input to $\gamma_H + t_1$. The tariff does nothing to

The ADMA argued that punitive duties should be assessed on the foreign screens in order to level the playing field in the display screen industry.

alter F*'s costs of producing the high-quality good. Firm F is then at a cost disadvantage, relative to F*, if it desires to continue producing a high-quality product. Further, the imposition of such a tariff does nothing to alter the profits that would be earned by firm F when it chooses to produce a low-quality product, because the equilibrium cost and market share structures for both firms (F and F*) in such a case are identical to those in the absence of the tariff.

If the equilibrium is in area (H) in the absence of any antidumping duties, then firms F and F* both produce high-quality goods and earn zero profits. After the tariff, production of the low-quality final good is still not sensible for firm F because the reaction functions illustrated do not shift under a tariff on the high-quality input.²¹ That is, the equilibrium cannot be moved from the (H) area into the (HL)

²¹ The reaction functions do not shift under an input tariff because they illustrate behavior in an equilibrium in which F produces the low-quality good and F* produces the high-quality good. Neither firm's cost changes in such an equilibrium in the presence of an input tariff. The reaction functions would shift under a tariff on the final good, however. Such a tariff effectively raises the costs of the foreign final good firm and changes the position of the T_H reaction function. A subsidy provided to the domestic input producer would also change the equilibrium illustrated in Figure 4 by shifting the T_L reaction function. See Skeath (1993) for a more comprehensive analysis of these alternative policies.

area with only a simple input tariff. There are additional consequences of the tariff, however. With the tariff in place, firm F cannot earn even zero profits by producing the high-quality final good. The domestic firm is at a cost disadvantage relative to the foreign firm after the tariff so that if F^* were to price at its marginal cost of γ_H , firm F would not be able to match that price without realizing a loss on each unit sold. In the presence of the antidumping duty, then, firm F is forced to withdraw from the market.²² Without firm F in the market, the domestic input producer is left without a buyer for its product and must also withdraw.

Conclusion

The model described above provides significant insight into the actions of the various firms involved in the ADMA antidumping case. In any market where the producer of a low-quality input faces relatively high production costs, that producer may perceive the pricing behavior of a lower-cost foreign rival to constitute "unfair" competition. A request for punitive duties would then be a reasonable one for the "damaged" firm to make. Of course, as in the model and in the ADMA case, firms in other industries may be hurt by the imposition of such duties; the damage done to an interdependent industry may then be reflected onto the protected industry itself.

This type of scenario plays itself out in the model of quality-differentiated vertical trade presented here, and it apparently occurred in the case of the U.S. display screen industry as well. A producer of a low-quality input finds itself unable to encourage domestic demand for its product even when pro-

ected by a tariff on the rival, higher-quality input. The reasoning is seen clearly in the theoretical model; antidumping duties do not improve the profitability of the domestic final good producers when they use the domestic input in production. If the low-quality input was an unprofitable choice before the tariff, then it remains so after the tariff. Further, other related industries can be badly hurt by such duties. Despite the ADMA's original statements to the contrary, direct protection cannot, in a case such as this, guarantee the viability of an industry producing a low-quality input. In light of the model's results, it is not so surprising that the low-quality producer itself was the one to request an end to the protection on display screens, particularly if it was influenced by a business association with one of the laptop computer (final good) manufacturers.

The inability of the antidumping duty to adequately "protect" the viability of the display screen industry follows from the vertical relationship between that industry and the laptop industry itself. Other policy options available to governments, however, might be more useful in guaranteeing the survival of such an input industry. In particular, given the arguments of the laptop producers that the domestic input producers could provide neither the quality nor the quantity necessary to supply their needs, efforts to secure the future of the display screen industry might be directed at these specific aspects of the industry.

²² In the case of the ADMA and American laptop producers, the final good producers chose to move their production facilities abroad in order to avoid the input cost increase without withdrawing completely from the market.

References

- Andrews, Edmund L. 1993. "Duties Ended on Computer Flat Screens." *The New York Times*, June 23, p. D1.
- Bradsher, K. 1992. "End Is Urged to Duty on Flat Screens." *The New York Times*, November 17, p. D1.
- Brander, James A. and Paul R. Krugman. 1983. "A 'Reciprocal Dumping' Model of International Trade." *Journal of International Economics*, vol. 15, no. 3/4, pp. 313-21.
- Chang, Winston W. and Jae-Cheol Kim. 1989. "Competition in Quality-Differentiated Products and Optimal Trade Policy." *Keio Economic Studies*, vol. 26, pp. 1-17.
- . 1991. "Strategic Tariff Policy in a Model of Trade in Intermediate and Final Products." In A. Takayama, M. Ohyama, and H. Ohta, eds. *Trade, Policy, and International Adjustments*. Academic Press: San Diego.
- Chang, Winston W. and Fang-Yueh Chen. 1992. "Export Rivalry in Vertically Related Markets." Mimeo. SUNY-Buffalo. September.
- Das, Satya P. and Adwait K. Mohanty. 1984. "Dumping in International Markets and Welfare: A General Equilibrium Analysis." *Journal of International Economics*, vol. 17, No. 1/2 (August), pp. 149-58.
- Dixit, Avinash K. 1988. "Anti-Dumping and Countervailing Duties Under Oligopoly." *European Economic Review*, vol. 32, January, pp. 55-68.
- Ethier, Wilfred J. 1982. "Dumping." *Journal of Political Economy*, vol. 90, no. 3, pp. 487-506.
- Farnsworth, Clyde H. 1991. "U.S. Ruling on Screens Favors Japan." *The New York Times*, February 15, p. D1.

- Fisher, Lawrence M. 1991. "Half Smiles on Flat Panels." *The New York Times*, July 14, III, p. 12.
- Hart, Jeffrey A. 1993. "The Anti-Dumping Petition of the Advanced Display Manufacturers of America: Origins and Consequences." *World Economy*, January, pp. 85-109.
- Helpman, Elhanan and Paul R. Krugman. 1989. *Trade Policy and Market Structure*. MIT Press: Cambridge, MA.
- Herander, Mark G. and J. Brad Schwartz. 1984. "An Empirical Test of the Impact of the Threat of U.S. Trade Policy: The Case of Antidumping Duties." *Southern Economic Journal*, July, pp. 59-79.
- Johnson, B. T. 1992. "Laptops: U.S. Pulls Plug on a Domestic Industry." *The Wall Street Journal*, August 12, p. A10.
- Lachica, Eduardo. 1991a. "U.S. Is Urging Some Penalties in Screen Case." *The Wall Street Journal*, July 9, p. B5.
- . 1991b. "ITC, in Big Blow to U.S. Laptop Makers, Tacks Steep Duties on Japanese Screens." *The Wall Street Journal*, August 16, p. B3.
- Nomani, Asra Q. 1993. "U.S. Cuts Duties on Some Japanese Computer Screens." *The Wall Street Journal*, January 21, p. A5.
- Pollack, A. 1991a. "Duties Sought from Japan on Some Computer Screens." *The New York Times*, July 9, p. D1.
- . 1991b. "Duties on Japanese Screens for Laptops Cleared by U.S." *The New York Times*, August 16, p. D1.
- Rodrik, Dani and Chang-Ho Yoon. 1989. "Strategic Trade Policy When Domestic Firms Compete Against Vertically Integrated Rivals." NBER Working Paper No. 2916. April.
- Ronnen, Uri. 1991. "Minimum Quality Standards, Fixed Costs, and Competition." *Rand Journal of Economics*, vol. 22, pp. 490-504.
- Sanger, D. E. 1991a. "U.S. Tariff Appears to Backfire." *The New York Times*, September 26, p. D1.
- . 1991b. "I.B.M. Chief Issues Threat on U.S. Tariff." *The New York Times*, November 8, p. D4.
- Skeath, Susan E. 1993. "Quality Differentiation and Trade in Vertically Related Markets: Protecting a Low Quality Input Producer." Wellesley College Working Paper No. 93-01.
- Spencer, Barbara J. and Ronald W. Jones. 1991. "Vertical Foreclosure and International Trade Policy." *Review of Economic Studies*, 58, pp. 153-70.
- . 1992. "Trade and Protection in Vertically Related Markets." *Journal of International Economics*, vol. 32, pp. 31-55.
- The Wall Street Journal*. 1991a. "Hosiden of Japan Will Halt Exports of LDCs to U.S." August 23, p. B3C.
- . 1991b. "Toshiba Shifts Output of Some Laptop PCs from U.S. over Tariff." September 26, p. B2.
- Webb, Michael A. 1987. "Anti-Dumping Laws, Production Location and Prices." *Journal of International Economics*, vol. 22, no. 3/4, pp. 363-68.
- . 1992. "The Ambiguous Consequences of Anti-Dumping Law." *Economic Inquiry*, vol. 30, pp. 437-48.
- Zachary, G. P. 1991. "Duty on Screens Could Lift Price of U.S. Laptops." *The Wall Street Journal*, February 11, p. B1.

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