

# research review



Issue No. 3, January 2005 - June 2005

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# research review

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*Research Review* provides an overview of recent research by economists of the Research Department of the Federal Reserve Bank of Boston. Included are summaries of scholarly papers, staff briefings, and Bank-sponsored conferences, as well as a reference list of materials by Research Department economists recently published externally.

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**Working Papers** present statistical or technical research. They are generally written for economists and others with strong technical backgrounds.

**Public Policy Discussion Papers** present research bearing on policy issues. They are generally written for policymakers, informed business people, and academics.

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# Public Policy Discussion Papers

p-05-1

## The Taxation of Equity, Dividends, and Stock Prices

by *Richard W. Kopcke*

complete text: <http://www.bos.frb.org/economic/ppdp/2005/ppdp051.pdf>

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### Motivation for the Research

The Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) essentially halved the tax rate on dividends and reduced the top tax rate on capital gains, so that dividends and long-term gains are now taxed at about one-half the rates on short-term gains. This paper explores the likely effect of JGTRRA on the valuation of corporations' common stock.

### Research Approach

Looking at data for companies that have been included in the S&P 500 index at any time during the last 20 years, the author analyzes the dividend policy of each corporation. Only 28 of these companies had reduced dividends as a share of earnings and reduced their outstanding shares through repurchases before JGTRRA.

He also examines companies' incentives for retaining earnings, purchasing their own shares, and distributing earnings as dividends, by extending the Gordon model of stock prices to include the effect of taxes on the cost of capital and the value of equity. He applies this analysis of the cost of capital to companies' demand for capital assets to assess the likely macroeconomic effect of the tax changes of 2003.

### Key Findings

- Both larger corporations' past behavior and theory suggest that the tax cuts are not likely to increase dividend payouts significantly.
- Instead, in the short run, dividends will continue to rise in the customary way in response to the recovery in earnings.
- In the longer run, the tax cuts will principally reduce companies' cost of capital, fostering capital deepening, when the economy is at full employment.
- This capital deepening reduces the return on capital, which in turn encourages companies to retain a larger share of earnings to fund their capital budgets.
- Because the tax cuts increase the value of each dollar of earnings for shareholders, they could raise price-earnings ratios by more than 10 percent, and stock prices by more than 6 percent.
- By fostering capital deepening, the tax cuts also tend to increase the real compensation of labor at full employment.

### Implications

As a result of the tax cuts on dividends and capital gains, both average real returns on equity and dividend yields need not be as high as they were during much of the last half century in order to attract capital. Unless the economy's potential rate of growth or rate of inflation is significantly higher than current estimates, about 3.5 percent and 2.5 percent, respectively, the composition of returns on equity will shift toward dividends once again, albeit not as strongly as before 1994.

# Working Papers

w-05-1

## Technological Diversification

by Miklós Koren and Silvana Tenreyro

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp051.pdf>  
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### Motivation for the Research

Economies at early stages of the development process are often shaken by abrupt changes in growth rates. In an earlier paper, the authors quantified the contribution of various factors at different stages of development, finding that the high volatility in poor countries is due to (1) higher levels of sectoral concentration, (2) higher levels of sectoral risk (that is, poor countries not only specialize in few sectors, but those sectors also tend to bear particularly high risk), and (3) higher country-specific macroeconomic risk.

A volatility accounting exercise carried out by the authors indicates that approximately 50 percent of the differences in volatility between rich and poor countries can be accounted for by differences in the sectoral composition of the economy (higher concentration and sectoral risk), whereas the other 50 percent is due to country-specific risk.

These characteristics of the development process are inconsistent with previous theoretical explanations of the dynamics of volatility and development. In this paper, the authors provide an alternative theory that is in line with the empirical evidence.

### Research Approach

The authors develop an endogenous growth model of technological diversification. In the model, the number of varieties evolves endogenously in response to profit incentives. The consequent change in volatility associated with changes in the number of varieties feeds back into the investment and savings decisions of producers.

The key idea of the model is that firms using a larger variety of inputs can mitigate the impact of shocks affecting the productivity of individual inputs. In order to explore why poorer countries specialize in less sophisticated sectors, the authors extend the model to allow for international mobility of goods and for cross-country differences in endowments.

The model leads to a set of predictions concerning the relationships among productivity, volatility, and technological diversification. The authors discuss these predictions in the light of empirical evidence and then conduct robustness checks.

### Key Findings

- Technological complexity both increases average productivity and reduces the volatility of productivity. The expansion of varieties of inputs leads to lower volatility of production via two channels. First, as each individual input matters less in production, productivity becomes less volatile by the law of large numbers. Second, whenever a shock hits a particular input, firms can adjust the use of the other inputs to partially offset the shock.
- More complex sectors are both more productive and less volatile; there is no evidence of a mean-variance frontier. As countries develop, they use more sophisticated technologies, which

leads to both higher productivity and lower variance.

- In the multi-sector version of the model, two channels explain the negative association of volatility with development: first, a within-sector channel, whereby a given sector exhibits higher technological complexity in more-developed countries, and, second, a compositional channel, whereby poor countries specialize in relatively less complex sectors.

- Within a sector, in addition to decreasing with increasing technological complexity, volatility also decreases with increasing skill intensity and the size of the sector.

- Countries with high profit rates and low investment costs will develop faster, implying both a faster growth of output and a faster fall in volatility.

- An alternative explanation for the decline of volatility with development is that high-income countries specialize in differentiated products, which are subject to idiosyncratic demand and supply shocks. The authors' findings suggest that "output diversification" does not contribute significantly to the decline of volatility.

### **Implications**

The fact that the predictions of the model developed in this paper fit the empirical data better than previous theories suggests that the model may have captured the essential channels whereby increasing technological complexity leads to increasing productivity and decreasing volatility.

w-05-2

## **Contingent Reserves Management: An Applied Framework**

*by Ricardo Caballero and Stavaros Panageas*

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp052.pdf>  
email: [caball@mit.edu](mailto:caball@mit.edu), [panageas@wharton.edu](mailto:panageas@wharton.edu)

### **Motivation for the Research**

One of the most serious problems that a central bank in an emerging market economy can face is the sudden reversal of capital inflows ("sudden stops"). Hoarding international reserves can be used to smooth the impact of such reversals, but these reserves are seldom sufficient and always expensive to hold.

In this paper, the authors analyze the investment decisions of a central bank that seeks to minimize the real costs of a sudden stop of capital inflows. Their goal is to provide a simple model to isolate the portfolio problem associated with such an objective.

### **Research Approach**

The paper presents a simple static portfolio model for a central bank concerned with sudden stops. The model is solved under various assumptions on hedging opportunities. Using data from nine countries—Argentina, Brazil, Chile, Indonesia, Korea, Malaysia, Mexico, Thailand, and Turkey—representing emerging market economies open to international capital markets during the 1990s, the authors estimate key parameters of the model from the joint behavior of sudden stops and the S&P implied volatility index (VIX), and then use the parameters to generate optimal portfolios. Finally, they document the impact of different hedging strategies on the availability of reserves during sudden stops.

### **Key Findings**

- In an ideal setting, where countries and investors can identify the jumps in the VIX and there

exist call options on these jumps, an average emerging market economy may expect to face a sudden stop with up to 40 percent more reserves than when these options are not included in the central bank's portfolio.

- The main reason behind this important gain is the close relationship between jumps in the VIX and sudden stops: The probability of a sudden stop conditional on a jump in the VIX is about four times the probability of a sudden stop when there is no jump.

- While the probability of a jump in the VIX when there is no sudden stop in emerging markets is slightly above 30 percent, it rises to over 70 percent when a sudden stop takes place in that year.

- Adding richer hedging instruments to the portfolios held by central banks can significantly improve the efficiency of the anti-sudden-stop mechanism.

### **Implications**

Although the VIX is useful because it is correlated with implied volatilities and risks in emerging markets, it also captures problems that are U.S.-specific. Ideally, one would want an index that weights differently U.S. events that are likely to have world-wide systemic effects from those that do not. It should be relatively easy to construct implied volatility indices that isolate the former factors and still preserve the country-exogeneity properties of the VIX. Constructing such indices is important to create benchmarks and develop liquid hedging markets for economies exposed to capital flow volatility, and the authors believe that if hedging practices were to be adopted by central banks generally, we would soon observe the emergence of new implied volatility indices that better match the needs of emerging market economies.

An issue that the authors point to, but do not address in this paper, is the incentive effects that a modified central bank's policy of hedging external shocks may have on the private sector. This is an important concern, as the private sector may undo some of the external insurance in anticipation of the central bank's intervention. To mitigate that potential effect may require coordination of the hedging policy with monetary and regulatory policies. However, even in the absence of such complementary policies, perverse incentive effects are unlikely to be strong enough to fully offset the benefits of more aggressive hedging practices.

w-05-3

## **The Liquidity Trap, the Real Balance Effect, and the Friedman Rule**

*by Peter Ireland*

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp053.pdf>

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### **Motivation for the Research**

With inflation seeming to have stabilized since the 1990s to levels associated with the period before 1960, monetary economists and central bankers have recently rediscovered some of the special problems that can arise under conditions of price stability, chief among them the problems associated with the liquidity trap.

In this paper, the author studies the behavior of the economy and the efficacy of monetary policy under zero nominal interest rates.

### **Research Approach**

Krugman and Svensson have separately reconsidered the idea of the liquidity trap, using state-



of-the-art monetary models in which optimizing agents have rational expectations. Absent from these new models of the liquidity trap is the idea of the real balance effect, whereby a change in real balances impacts household wealth and thus affects consumption and output, enabling the central bank to influence the economy even after the nominal interest rate hits its lower bound.

By introducing population growth, as modeled by Weil, to the Krugman framework, the author establishes assumptions under which the real balance effect reappears.

### **Key Findings**

- A real balance effect fails to appear in Krugman's and Svensson's models because these models, which feature a single, infinitely lived representative agent, depict economic environments in which government-issued money is not a component of aggregate private-sector wealth. This result stems from a version of the Ricardian equivalence theorem, which also states that in the same models, government-issued bonds are not a component of private-sector wealth.

- With a growing population, households alive in the present pay only a fraction of the taxes to be levied in the future when the government chooses to contract the money supply. Money becomes net wealth; consequently, an operative real balance effect gives the central bank control over the price level even when the nominal interest rate equals zero; that is, the liquidity trap disappears.

- The same distributional effects that give rise to the real balance effect can also work to make many agents much worse off under a zero nominal rate than they are when the nominal interest rate is positive.

- Paradoxically, a zero nominal interest rate is something to be achieved in the models in which the liquidity trap survives; with the introduction of the real balance effect, a zero nominal interest rate becomes something to be avoided.

### **Implications**

The findings suggest that the principal dangers posed by deflationary policies have little to do with zero nominal interest rates per se and even less to do with the Keynesian liquidity trap. Rather, both the problems and their ultimate solutions lie in the mechanics through which deflationary policies are implemented.

w-05-4

## **Interest Sensitivity and Volatility Reductions: Cross-Section Evidence**

*by F. Owen Irvine and Scott Schuh*

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp054.pdf>

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### **Motivation for the Research**

As has been widely observed, the volatility of GDP has declined since the mid 1980s compared with prior years. One leading explanation for this decline is that monetary policy improved significantly in the later period. Most of the initial studies investigating volatility reduction examined aggregate data. More recent studies have used disaggregated data, which offer the opportunity to exploit cross-sectional variation across industries for better identification of hypothesized explanations.

In this paper, the authors investigate the better-monetary-policy explanation of reduced volatility of GDP, analyzing a cross-section of 2-digit manufacturing and trade industries.



## Research Approach

Since a major channel through which monetary policy operates is variation in the federal funds rate, the authors hypothesized that industries that are more interest sensitive than others should have experienced larger declines in the variance of their outputs in the post-1983 period. Using quarterly data from the Bureau of Economic Analysis for the manufacturing and trade sector and a variety of vector autoregression (VAR) models, the authors estimate for each industry three interest-sensitivity measures—the standard deviation of the impulse-response function (IRF) of sales to a shock to the federal funds rate, the cumulative IRF of sales to a change in the federal funds rate, and the sum of the lagged coefficients on the federal funds rate in the sales equation of the VAR. They then run cross-sectional regressions explaining industry output volatility reductions as a function of these interest-sensitivity measures.

## Key Finding

- Although the estimated coefficients in the cross-section regressions are generally of the expected sign, there is little evidence of a statistically significant relationship between industry output volatility reductions and the authors' measures of interest sensitivity.

## Implications

Although the findings do not rule out conclusively the better-monetary-policy hypothesis, they pose challenges for the hypothesis that improved monetary policy is a major factor in the decline in GDP volatility. In particular, monetary policy must have improved in such a way as to reduce the output variances of all industries without influencing interest-sensitive sectors relatively more.

These results using manufacturing and trade data are based on studying only a subset of the goods sector of GDP. It is possible that the major channel through which improved monetary policy lowered the volatility of GDP was by reducing the variance of the structures sector and the covariance of the structures sector with the goods sector. However, from the authors' decomposition of variance in a previous paper, this channel accounts for at most about 28 percent of the reduction in GDP volatility.

w-05-5

# Sales Persistence and the Reductions in GDP Volatility

by *F. Owen Irvine*

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp055.pdf>

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## Motivation for the Research

A number of explanations have been offered for the observed decline in GDP volatility since the mid 1980s. Valerie Ramey and Daniel Vine offered the hypothesis that a decline in the persistence of sales led to the decline in GDP volatility. Their theoretical production smoothing models show that a decrease in sales persistence leads to a decline in the variance of production relative to the variance of sales. They estimated equations explaining unit sales of motor vehicles that show that sales persistence declined in this industry after 1983.

This paper tests the Ramey-Vine hypothesis, first on sales data from the aggregate retail, wholesale, and manufacturing sectors, and then on sales data from many other industries. Finally, it explores reasons why sales persistence may have declined in some of these industries.

## Research Approach

Using monthly, seasonally adjusted sales data for available 2- and 3-digit SIC manufacturing and trade industries from January 1967 through March 2001, the author estimates equations using the same empirical model employed by Ramey and Vine.

## Key Findings

- The estimates confirm the Ramey-Vine findings for motor vehicle retailers, wholesalers, and manufacturers.
- In equations estimated for aggregate manufacturing, wholesaling, and retail sector sales, declines in sales persistence were not found, despite the fact that these manufacturing and trade sales aggregates each contain motor vehicle sectors.
- While sales variance decreased for most durable goods industries, outside of motor-vehicle-related industries this reduction in variance came mainly through channels other than a reduction in sales persistence.
- For the nondurable goods industries, sales persistence is estimated to have increased significantly at the retail level but decreased at the wholesaler and, especially, the manufacturing level.
- For a number of industries outside motor vehicles, especially those in wholesaling and non-durable manufacturing, considerable evidence was found of declines in sales persistence. These declines seem to be consistent with changes in supply and distribution chains that have occurred as the result of the introduction of new information technology and the adoption of new inventory and production control systems.

## Implications

There appears to be no indication of a decline in the persistence of the sales of the main goods sectors of the economy—manufacturing, wholesaling, and retailing. In this sense, the Ramey-Vine hypothesis—that declines in sales persistence are a major separate explanation of the decline in GDP volatility—is not supported.

However, the finding that sales persistence has declined in a number of industries seems to be consistent with the structural changes that have occurred as a result of the introduction of new information technology and the new relationships between upstream and downstream firms in supply and distribution chains. To prove that structural change is a major reason for the decline in GDP volatility will require further detailed modeling of the interactions among industries. Declines in sales persistence will probably be part of that story.

w-05-6

## The Stock Market and Cross-Country Differences in Relative Prices

*by Borja Larrain*

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp056.pdf>  
email: [borja.larrain@bos.frb.org](mailto:borja.larrain@bos.frb.org)

## Motivation for the Research

The fact that finance can affect real activity is well established by now. In general, the evidence shows that financial arrangements are an important driving force of many real-side phenomena and not just a companion or by-product of the real economy.

This paper explores how stock market development affects cross-country differences in relative prices, also known as the real exchange rate. The real exchange rate is a key variable for making comparisons of the cost of living in different countries and for determining the current account balance.

### **Research Approach**

The author develops a small-open-economy model, estimated by cross-section regression analysis on data from 82 countries, and analyzes its implications to explain the connection between stock market development and relative prices. The model examines what can be interpreted as the transition from an economy based on private entrepreneurship to a stock market economy. In the terminology of the model, stock market assets (or the technologies underlying these assets) are more capital-intensive than entrepreneurial assets. This paper studies what happens to the relative price of nontradable goods (wages) as capital is shifted from entrepreneurial assets to stock market assets.

### **Key Findings**

- Empirically, there is a nonlinear relationship between prices and the development of the stock market: Prices and the stock market increase together in the beginning; then prices fall as the stock market continues to develop.
- Among rich countries, the relationship between prices and the stock market is negative after controlling for per capita income and using legal origins to control for the endogeneity of stock market development.
- The development of the stock market affects real exchange rates via the relative price of nontradables: Better investment opportunities increase consumption levels and the price of nontradable goods (income effect); but if stock market assets are less labor-intensive than previous entrepreneurial technologies, prices can fall as the stock market grows because more labor is available for producing nontradables (substitution effect.)

### **Implications**

Finding an effect of the stock market on relative prices can have important repercussions. From the policy standpoint, it is important that stock market development raises wages in the beginning. It is a “win-win” situation, where capitalists and workers increase their welfare (at least in this model). The decrease in wages that occurs at some point as the stock market keeps developing may explain why some countries fail to develop their financial systems to the maximum or why they fail to eliminate all regulations. If higher stock market development lowers wages (that is, workers are able to buy less of the tradable good), we can expect workers to oppose its development. How these political considerations determine the actual level of financial development in a country is an interesting area of present and future research. In seeking to understand why small financial systems fail to develop, the simple answer may be that further financial development may not be to everyone’s advantage.

# Borrowing Costs and the Demand for Equity over the Life Cycle

by Steven J. Davis, Felix Kubler, and Paul Willen

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp057.pdf>

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## Motivation for the Research

Borrowing presents a problem for life-cycle models of consumption and portfolio choice. In the classic Merton-Samuelson model, modified to include a realistic process for labor income, unsecured borrowing leads to huge, highly leveraged equity positions.

Life-cycle models that preclude borrowing can generate realistic equity holdings, but they fly in the face of evidence that unsecured consumer credit is widely available and widely used. In fact, unsecured debt is much more prevalent than equity in the portfolios of younger households.

In this paper, the authors construct a life-cycle model that resolves the tension between borrowing and equity holding.

## Research Approach

The authors use a life-cycle model in which households can borrow, but at rates that exceed the risk-free investment return. Except for its treatment of borrowing, the model is standard. Agents face realistic income processes and can invest in risky and risk-free assets. The key elements of the analysis are realistic borrowing costs and the life-cycle structure.

## Key Findings

- A model with a wedge between borrowing costs and the risk-free investment return can simultaneously deliver sensible life-cycle profiles for debt and equity holdings and high rates of nonparticipation in equity markets.
- Realistic borrowing costs dramatically reduce equity holdings, and equity demand is at its minimum when the borrowing rate equals the expected return on equity.
- The model with realistic borrowing costs does a better job of fitting observed life-cycle patterns in borrowing, equity market participation, and equity accumulation than alternative models with no borrowing or limited borrowing at the risk-free rate.
- The analysis highlights the role of borrowing costs and leverage as key factors in the demand for risky assets.

## Implications

The opportunity to borrow at realistic rates in a life-cycle setting has important consequences for wealth accumulation. Because households face an upward-sloping income profile, they borrow in the early part of the life cycle, which delays the age at which they participate in equity markets or accumulate significant holdings. This implication of the model helps explain the low equity holdings of most households in the face of an apparently high equity premium.

The model implies that most households accumulate little or no financial wealth until middle age, consistent with much empirical evidence. Given its simplicity and its assumption of time-consistent, rational consumers, the model and analysis challenge claims that households save too little, or that they should be prompted to save more.



# Intrinsic and Inherited Inflation Persistence

by Jeffrey C. Fuhrer

complete text: <http://www.bos.frb.org/economic/wp/wp2005/wp058.pdf>

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## Motivation for the Research

In recent years, much of the development of Phillips curves has centered on two issues: (1) the emergence of real marginal cost (versus an output gap measure) as the preferred driving variable in the specification, on both theoretical and empirical grounds; and (2) the incorporation of frictions into optimizing rational expectations models. The frictions have been ad hoc in that they are not micro-founded. Still, the prevailing view is that, after allowing for just a little friction, the baseline model works well.

This paper explores the validity of this emerging consensus on price-setting models.

## Research Approach

The author demonstrates analytically the propositions about inherited persistence for the forward-looking model; analyzes the case of the hybrid model; considers some extensions, including a model with explicit monetary policy; and considers the implications of possible recent changes in the persistence of inflation. Finally, he examines reduced-form properties in the data that will lead to structural models that embody a small coefficient on the driving process and a relatively large variance of the inflation shock.

## Key Findings

- Regardless of the persistence in the driving process, very little of that persistence is inherited by inflation in the conventional New Keynesian Phillips Curve (NKPC). This result runs counter to the common intuition that inflation in the NKPC directly inherits the persistence of the driving process, which, in the case of real marginal cost (or proxies thereof), is quite considerable.
- In part, the lack of inherited persistence derives from the presence of a large inflation shock whose variance is typically one to five times as large as the shock that perturbs the driving process.
- The lack of persistence also derives from a rather small estimated coefficient—on the order of .001 to .05—on the driving process. The paper presents a battery of new estimates of this key coefficient, which are uniformly small and insignificant.
- The predominant source of inflation persistence in the NKPC is the lagged inflation term. The amount of persistence imparted by the lag is quite sensitive to its size, with significant differences in persistence implied by an increase in the weight on past inflation from 0.3 to 0.6.
- As several papers have noted, the persistence of inflation appears to have declined in recent years. If that is true, this paper suggests that the reason for the decline in persistence is unlikely to be related to a decline in the persistence of the driving process.

## Implications

The findings of this paper suggest that the optimizing foundations in the standard specifications are nearly unrelated to the dynamics observed in the data for inflation and real marginal cost. That is, lagged inflation is not a second-order add-on to the optimizing model; it is the model. One may motivate price-setting behavior from these optimizing foundations, but in practice, they tell us little about why inflation behaves the way it does.

Because monetary policy in the standard models acts through its effect on output and marginal cost, it becomes more difficult to attribute recent changes in inflation persistence to changes in

monetary policy. This does not necessarily imply that monetary policy has had no such effects, but it does suggest that the current crop of models will have difficulty in attributing such changes to monetary policy.

The conclusions also imply that in order to understand inflation dynamics, we will need to identify the economic source of the large inflation shock in the specification. In turn, the findings in this paper imply either that this identified shock is itself highly autocorrelated or that we require a micro-founded mechanism that generates substantial intrinsic persistence in inflation.

## Public Policy Briefs

b-05-1

### **Regional Differences in the Impact of Energy Price Increases**

*by Katharine Bradbury*

complete text: <http://www.bos.frb.org/economic/ppb/2005/ppb051.pdf>

email: [Katharine.Bradbury@bos.frb.org](mailto:Katharine.Bradbury@bos.frb.org)

This Public Policy Brief presents estimates of the impact of price increases projected by the U.S. Department of Energy for the winter of 2004–5 on consumers in the nine Census divisions and selected metropolitan areas. It is based on materials presented in a briefing to the President of the Federal Reserve Bank of Boston in December 2004.

#### **Motivation for the Research**

The Energy Department forecast that energy prices would be considerably higher in the winter of 2004–5 than in the previous winter. Indeed, in December of 2004, when this analysis was prepared, some prices were already noticeably higher. The department forecast especially large increases for heating oil, a fuel used much more extensively in New England than elsewhere in the country. Gasoline costs were also considerably higher than a year earlier, and driving costs loom larger in the market baskets of consumers outside the Northeast, on average. This brief estimates the impact of the Energy Department's projected energy price increases on consumers in the nine Census divisions and selected metropolitan areas.

#### **Research Approach**

The estimates are based on the fuel mix used for heating and other residential energy use (lighting, water heating, air conditioning, appliances, etc.) across the nine Census divisions, the relative importance of home energy use and motor fuel use in each area's consumer market basket, and the fuel price increases projected by the Energy Department.

#### **Key Findings**

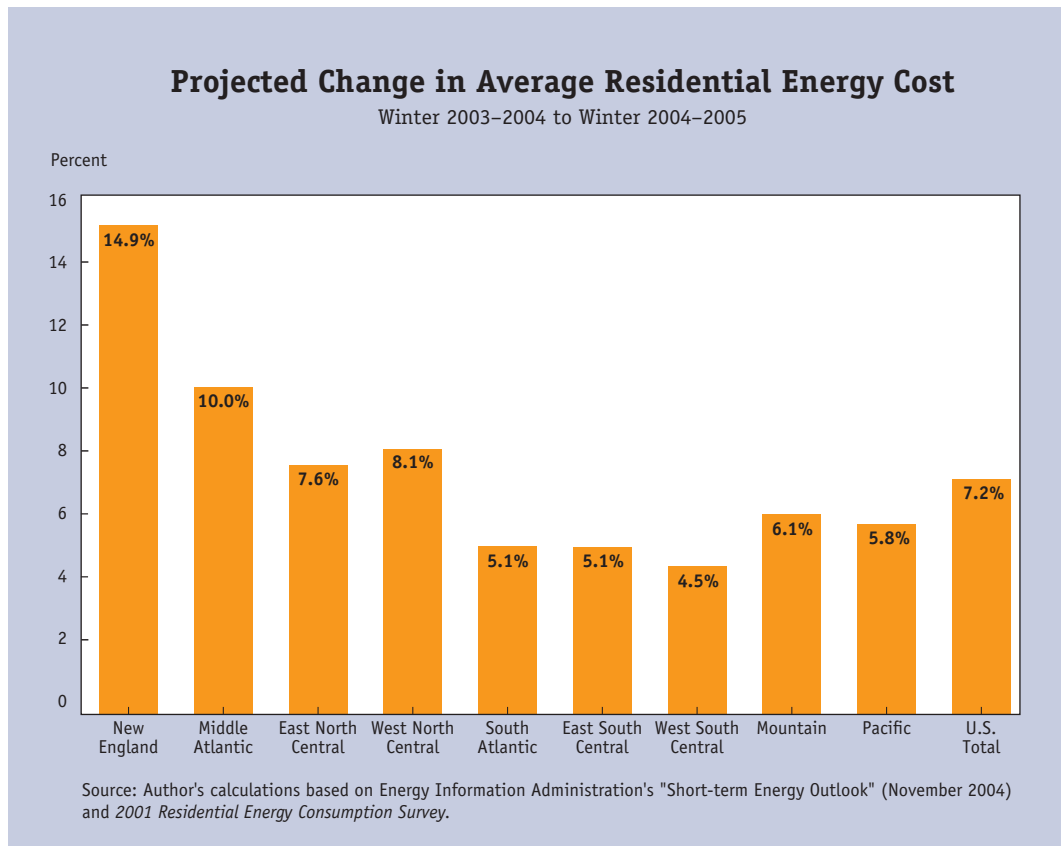
- Because of New England's heavy dependence on heating oil, the fuel facing the sharpest projected price increase, New England's residential energy costs were expected to rise the fastest among the nine Census divisions—almost 15 percent from the previous winter.
- The next highest projected increase was in the Mid-Atlantic states, where heating oil is used by one-quarter of households and amounts to 10 percent of residential energy expenditure; the resulting projected average price increase for residential energy was 10 percent, while the projected national average increase in residential energy costs was 7.2 percent.

- The Boston metro area, which includes parts of Connecticut and New Hampshire as well as eastern Massachusetts, suffered the biggest projected hit to non-shelter, non-fuel consumption, totaling a 2.4 percent decline.

### Implications

Changes in spending required by energy price increases in the winter of 2004–5, while not huge, could still represent a noticeable hit to consumers' budgets. Furthermore, since the calculations yield average effects, some households in each region or metro area will face much larger increases in costs, and some, much smaller, depending on the individual fuels used and energy's share of the budget of each household.

Since U.S. manufacturers and other producers also use various fuels, increases in energy prices could have differential regional effects on employment, depending on the relative importance of energy-dependent industries. In addition, regions that produce oil and natural gas benefit from price increases on the production side, even as their consumers face higher fuel bills. However, since much of oil and natural gas consumed within the country is imported, a substantial share of the blow to U.S. consumer and producer budgets is not balanced by increases in domestic income.





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