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Risen in the 1990s?**

John V. Duca

**Intellectual Property Rights
And Product Effectiveness**

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Has Long-Run Profitability Risen in the 1990s?

John V. Duca

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This article analyzes the recent rebound in nonfinancial corporate profitability, as measured by after-tax profits as a share of output. Virtually all the resurgence in corporate profitability during the 1990s reflects a cyclical increase in profits and a decline in net interest expense associated with deleveraging and lower interest rates. In this sense, it is not clear that a long-lasting upward shift in the economic returns to capital has occurred, after accounting for short-run cyclical-related movements and for how deleveraging and lower interest rates have shifted capital payments away from debtholders toward equityholders.

Intellectual Property Rights and Product Effectiveness

Stephen P. A. Brown and William C. Gruben

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Recent economic literature concludes that an invention-importing country, where domestic invention is scarce or nonexistent, may reduce its welfare and, in some cases, world welfare, by protecting intellectual property developed elsewhere. The analysis presented in this article uses economic theory to show that such a conclusion may not be fully warranted for a wide range of products, such as antibiotics, fungicides, herbicides, and pesticides, whose effectiveness diminishes with cumulative use. Both developed and developing countries may find that protecting intellectual property rights for these products will enhance welfare—even when their invention is provided for free.

Is the Business Cycle of Argentina “Different”?

Finn E. Kydland and Carlos E. J. M. Zarazaga

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Despite the relative success of Real Business Cycle (RBC) models to replicate key moments of the business cycles of the United States and several European countries, economic research in Latin America tends to take the more traditional view that monetary factors play a predominant role in the economic fluctuations of countries in that part of the world. The different theoretical approach is often justified on the grounds that business cycles in Latin America are “different.” However, few comparative studies have analyzed the relevant differences between the business cycles of Latin America and those of the United States and Europe.

In this article, Finn Kydland and Carlos Zarazaga present business-cycle facts for Argentina, following as closely as possible the empirical methodology and statistics other studies have used to characterize U.S. and European business cycles. Overall, the authors find no *a priori* evidence that dynamic general equilibrium models, in which real shocks are the only source of economic fluctuations, cannot potentially account for as much of the Argentinean business cycle as such models do for business cycles in the United States and Europe.

Has Long-Run Profitability Risen In the 1990s?

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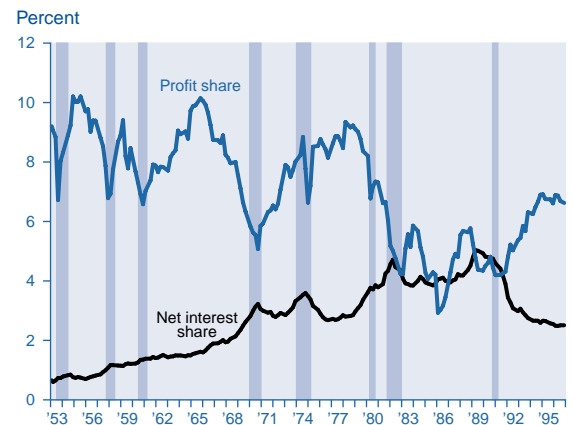
This article analyzes the underlying sources of the recent rebound in corporate profits. Contrary to popular perception, virtually all of the resurgence in corporate profitability during the 1990s reflects a cyclical increase in profits and a decline in net interest expense associated with deleveraging and lower interest rates.

After fluctuating in a high range during the 1960s and 1970s, the profit share (the ratio of after-tax profits to output) of nonfinancial corporations moved within a lower range through the early 1990s. In recent years, this measure of profitability has rebounded somewhat (*Figure 1*), largely owing to strong growth in corporate profits, which has both buoyed optimism about the long-run prospects for American companies—partly reflected by rising stock prices—and spurred criticism that companies have profited at the expense of workers (Bernstein 1995).

Whether the recent improvement is permanent or transitory is important for several reasons. First, profitability affects the financial strength of firms and has implications for their ability to weather downturns. Second, because retained earnings bolster investment, the permanence or impermanence of the recent improvement will have implications for investment and thus the long-run growth of the U.S. economy.¹ Finally, profitability is a key determinant of stock prices, which are important not only because they are indicators of future economic growth but also because they affect wealth and, thereby, consumption and investment.²

This article analyzes the underlying sources of the recent rebound in corporate profits. Contrary to popular perception, virtually all of the resurgence in corporate profitability during the 1990s reflects a cyclical increase in profits and a decline in net interest expense associated with deleveraging and lower interest rates. In other

Figure 1
After-Tax Profit and Net Interest Shares of U.S. Nonfinancial Corporations, 1953–96



NOTES: Break-adjusted for revisions associated with the shift to chain-weight GDP for the post-1958 period. The shaded areas denote recessions.

SOURCE: U.S. Bureau of Economic Analysis.

words, aside from cyclical movements in profitability, much of the recent improvement in profit share reflects the compositional effects of a shift in capital payments away from debtholders toward equityholders.

To establish these findings, the next section lays out a basic model of corporate profits, describing ways of adjusting profits for swings in net interest, the business cycle, oil prices, exchange rates, and government regulatory actions. The following sections discuss how corporate profitability and its determinants are measured and included in this model, and present empirical results and corporate profit measures adjusted for the aforementioned factors. The conclusion interprets the findings and discusses their implications.

What determines profitability?

Profits equal revenues minus costs, where revenues equal the product of prices (P) and the quantity of output (Y). Costs include nominal fixed costs (PF), which equal prices (P) times real or inflation-adjusted fixed costs (F); labor costs (WL), which equal compensation per hour (W) times work hours (L); nonlabor variable costs (vPY), which equal real variable costs per unit of output ($v < 1$) times prices (P) and real output (Y); depreciation of capital in nominal dollars (D); and net interest payments in nominal dollars (I) to debtholders. In the long-run, if the capital-labor ratio is fairly stable, hours worked generally move one-for-one with output after adjusting for trend productivity growth. Additionally, if real compensation moves one-for-one with labor productivity, then labor costs (WL) are a constant share ($w < 1$) of nominal output (PY).³ Combining these details, the level of nominal profits (Π) can be expressed as:

$$(1) \quad \begin{aligned} \Pi &= (PY) - PF - (wPY) - (vPY) - D - I \\ &= (PY) - PF - [(w + v)PY] - D - I, \end{aligned}$$

where $w + v < 1$ (otherwise profits would be negative). Dividing both sides by nominal output (PY) yields an expression for profits as a share of output:

$$(2) \quad \pi = [1 - (w + v)] - F/Y - D/PY - I/PY,$$

where the profit share $\pi = \Pi/PY$ and $[1 - (w + v)] < 1$. The term $[1 - (w + v)]$ reflects the pricing power of firms because it depends on the extent to which prices exceed average, short-run variable costs. The pricing power of firms falls the greater the degree of competition, either

from internal sources—which could stem from deregulation—or from foreign firms—which could stem from a rise in the real foreign exchange value of the dollar. Equation 2 indicates that four factors affect profitability: cyclical, relative price, depreciation, and net interest effects.

Cyclical factors. As real output growth picks up or as the economy operates at a higher level of capacity, the profit ratio should rise as real fixed costs (F) shrink as a share of output (Y) and if pricing power varies with the business cycle. Intuitively, profits tend to rise relative to output during economic recoveries and expansions, because fixed costs are spread over more output and perhaps also because producers may enjoy higher average profit margins when demand is high. Since the level of fixed costs other than depreciation is difficult to measure—in contrast to production—we can only readily control for output-related swings in the aggregate income share of fixed costs and in overall profit margins. Such cyclical swings are taken into account by including economywide measures of output growth and capacity.

Relative price factors. Relative prices can affect profits by altering the pricing power of domestic firms and by affecting how other costs vary with output. Swings in real exchange rates can alter the profit margins of U.S. firms by changing the relative competitiveness of foreign products. For example, when the foreign exchange value of the dollar jumped in the mid-1980s, many U.S. firms that produced traded goods saw the demand for their products decline because the high dollar made U.S. exports more expensive overseas and imports less expensive relative to U.S.-made goods to Americans in dollars. As a result, U.S. manufacturers experienced sharp declines in profits as demand for their output fell, reducing their pricing power and profit margins.⁴ In terms of equation 2, this relative price change affects the extent to which prices exceed variable costs, as reflected in the term $[1 - (w + v)]$.

Another important relative price is the real price of energy, which affects energy-using and energy-producing firms in different ways. The change in, rather than the level of, energy prices is used because profits are more affected by sudden changes in energy prices than by their level for two reasons. First, when oil prices rise, profits fall at energy-intensive firms because it takes time for them to pass higher input costs to their customers and because their production efficiency will decline until they can shift toward using more energy-efficient equipment

and practices. In terms of equation 2, this effect raises the variable cost of output (v). Second, the profitability of energy producers to some degree reflects capital gains or losses on inventories and reserves stemming from changes in oil prices. For example, following a jump in oil prices, the energy-producing firms will book the one-time capital gains on their oil holdings as profits. It is thus unclear whether the negative impact of higher energy prices on profits at energy-using firms theoretically outweighs the positive impact of higher energy prices on energy industry profits in practice. This empirical issue is relevant since most high-energy-using firms and oil firms are nonfinancial corporations. Because cyclical variables are taken into account, the inclusion of energy price changes allows us to assess, after controlling for the impact of energy on the business cycle, whether profits tend to be higher or lower during recessions induced by rising oil prices.

Depreciation. According to equation 2, profit share should be negatively related to the depreciation ratio (D/PY), which largely reflects the obsolescence of prior investment.

Net interest. A higher net interest ratio (I/PY) also lowers the profit ratio. Net interest would rise if firms borrow more to finance inventories, if real interest rates rise, or if firms shift from equity to debt financing.⁵ As for the last factor, the shift from equity to debt in the 1980s and its reversal in the 1990s first lowered and then boosted the profit ratio because the profit ratio reflects equity returns and the net interest ratio reflects debtholder returns.

Inflation. One omitted variable from this model is inflation. Public finance economists, such as Feldstein and Summers (1983), have argued that inflation hurts profits because many tax code provisions are not indexed for inflation. For example, higher inflation reduces firms' ability to depreciate capital for tax purposes because the nominal price of replacing older capital rises with inflation, whereas the tax write-offs for depreciation do not.

Data and variables

This section describes how the dependent and independent variables are constructed. The profits, net interest, and depreciation variables are based on data from the national income and product accounts for nonfinancial corporations, as financial corporate profits are sometimes distorted by short-run shocks (for example, weather-related insurance costs) or swings in securities prices associated with unexpected developments (for example, changes in interest

rates or when banks or thrifts book past loan losses or capital gains). The other variables fall into four categories: cyclical, relative price, regulation, and inflation. Many variables are from related work by Duca and VanHoose (1996 and forthcoming).

Profit share. The dependent variable is the after-tax profit share ($PRAT$) of nonfinancial corporate output.⁶ An income share approach to measuring profitability is used because of difficulties in measuring the rate of return on capital, as discussed in the box entitled "Measuring Profitability: Income Share Versus Rate of Return Approach." After-tax, rather than before-tax profits, are used to assess profitability from a long-term perspective primarily because of large, long-term shifts in direct corporate taxation (see the box entitled "Should Profitability Be Measured on a Before- or After-Tax Basis?"). The dependent variable excludes net interest in its numerator, and net interest enters the model as a right-side variable because of tax and other differences (see the box entitled "Net Interest: A Component or Determinant of Profitability?").

Depreciation. The depreciation ratio (D/PY) in equation 2 is measured by the ratio of consumption of fixed capital to output ($DEPRAT$).

Net interest. The net interest ratio equals the ratio of net interest payments to output ($INTRAT$).

Cyclical variables. To control for cyclical effects, the models include the t through $t-3$ lags of real GDP growth (GDP , $GDP1$, $GDP2$, and $GDP3$, respectively) and the four-quarter lag of year-over-year GDP growth ($GDPyoy4$).⁷ The latter controls for medium-term effects of economic growth, while using fewer degrees of freedom than would be the case if one used four more lags of quarterly GDP growth. In addition, the current and one-quarter lag of the unemployment rate (U_t and U_{t-1} , respectively) are included to control for the effects of capacity on profits discussed above.⁸ Both types of variables are included because fast GDP growth in the early stage of recovery from a deep recession may not adequately reflect that the level of fixed costs is high relative to output, which may not have fully recovered from that recession.

Relative price terms. Two types of relative price terms, real exchange rates and real oil prices, may have large effects on aggregate profit measures. Real exchange rates, denoted by RER , are measured using the Federal Reserve Board's series on the real trade-weighted value

Measuring Profitability: Income Share Versus Rate of Return Approach

Profitability can be measured using an income share or rate of return approach. The former approach measures profits as a share of output, whereas the latter expresses profits divided by the stock of capital. Each approach has relative strengths and weaknesses.

In theory, the rate of return approach seems preferable. If returns and capital invested can be accurately measured, then one can infer the rate of return. In such a case, a rate of return measure is superior to an income share variable because, in principle, the return on capital can change even if the income share is constant. For example, if capital were used more efficiently (that is, earned more per unit) and less were invested, then the income share of capital could be unchanged or fall, even though the return to capital has actually risen.

However, in practice, the income share approach has two advantages over rate of return measures. First, official capital stock measures for nonfinancial firms are available only on an annual basis, whereas quarterly income share variables are available.¹ The extra degrees of freedom (almost fourfold greater) allow for more rigorous and complete hypothesis testing. Second, there are a number of practical difficulties in accurately measuring the capital stock. For example, if an economic rather than a historical book-value approach to depreciation is used, the capital stock could plummet if the value of some capital were quickly written off based on shifting asset prices. Indeed, the value of structures in the nonfinancial corporate sector plunged in the early 1990s when government statisticians used market price data to downwardly adjust office building values, even though vacancy rates in the early 1990s and mid-1980s were similar. Because profits are measured contemporaneously, whereas the capital stock reflects previous investment and depreciation, the measured return on capital in the mid-1990s looks high largely because the measured rate of return jumped after the stock of office buildings was largely written off. However, it is difficult to construct a rate of return measure that tracks the value of the capital originally invested without distortions from large and uneven write-offs or capital gains.

Another source of measurement error arises with the shift from physical capital to human capital, the latter of which is more difficult to measure. For example, companies that invest much in research and development (R&D) by hiring scientists and engineers will appear to be less capital intensive than they really are according to a measure of the physical capital stock. Since investment is increasingly done in the form of R&D, conventional measures may overstate the real rate of return on capital by understating the stock of physical plus human capital. Thus, while measuring human capital raises problems for the rate of return and income share measures of profitability, they likely pose more difficulty for the rate of return approach.

Overall, practical considerations favor using an income share approach, which necessitates using data from the national income and product accounts. Table B.1 summarizes categories from these accounts and relates them to variables used in this article.

¹ In contrast, Nordhaus (1974) and Feldstein and Summers (1977) use annual rate of return data that provide few degrees of freedom and limit hypothesis testing.

Table B.1
Nonfinancial Corporate Business Data

This table summarizes the national income and product accounts (NIPA) of the nonfinancial business sector and relates NIPA categories to the variables used in the empirical model.

NIPA category	How this category affects variables in the model	1996:4 level in billions of dollars
1. Gross domestic product of nonfinancial corporate business* (= lines 2+3)	Used as the denominator of <i>PRAT</i> , <i>DEPRAT</i> , and <i>INTRAT</i>	4194.8
2. Consumption of fixed capital	Used as the numerator of the depreciation share, <i>DEPRAT</i>	401.6
3. Net domestic product (= lines 4+5+6+12)		3793.2
4. Indirect taxes and net transfers		415.2
5. Compensation of employees		2788.2
6. Corporate profits with inventory valuation and capital-consumption adjustment (= lines 7+8+9+10+11)		484.5
7. Profits before tax		425.9
8. Profits tax liability		148.1
9. Profits after tax	Used in the numerator of <i>PRAT</i>	277.8
10. Inventory-valuation adjustment		-9.2
11. Capital-consumption adjustment		67.8
12. Net interest	Used in the numerator of <i>INTRAT</i>	105.2

* Note that the cyclical variables *GDP* and *GDPyoy* in the model differ in that they are based on GDP data for all businesses (not just non-financial corporations) and are real, not nominal.

Should Profitability Be Measured on a Before- or After-Tax Basis?

Another measurement issue is whether to use before- or after-tax profits in defining profitability. On the one hand, there are two reasons for using before-tax profits. First, because net interest is measured on a before-tax basis in the national income and product accounts, to be consistent, so should profits. Second, in the short run, sluggish adjustment to swings in corporate taxation could actually result in before-tax profit ratios being less volatile than after-tax ratios, which may absorb the short-run impact of tax changes (see Feldstein and Summers 1977). On the other hand, in the long run, shifts in direct corporate taxation will distort before-tax profitability but not after-tax profitability because competition will eventually force companies to pass on the changing costs of taxation to their customers and to yield an equilibrium after-tax return to investors. This issue is important because direct corporate taxation has substantially fallen as a share of nonfinancial corporate output, from roughly 7 percent in the 1960s to 5 percent in the 1970s and to 3 percent in the 1980s and 1990s.¹ More recently, tax changes passed in 1993 (specifically, the alternative minimum corporate profits tax) increased this tax burden some, putting pressure on firms to boost before-tax earnings to maintain after-tax earnings for investors. Given the significance of these changes and because the analysis focuses on long-run, rather than short-run, movements in profitability, the ratio of after-tax profits to output (*PRAT*) is used to assess whether there is a substantial and lasting rise in profit share under way.

¹ Auerbach and Poterba (1987) discuss tax code changes affecting corporations.

of the dollar, which is based on exchange rates and consumer prices of the G-10 countries.⁹ Although there are broader measures of the real value of the dollar, this one is used because it is available over a longer sample period. Before 1968:1, when this series starts, *RER* equals the

1968:1 level. This useful assumption, which allows the regressions to start in the 1950s, is reasonable on two grounds. First, the real value of the dollar likely stayed in a narrow range over this earlier period, as exchange rates were fixed and inflation was low in the G-10 countries. Second, the inclusion of *RER* is economically significant largely because of the dollar's big rise and fall during the 1980s, which caused sizable swings in the profitability of traded-goods industries. Because exchange rates affect traded-goods prices with a lag, they often affect domestic profits with a lag. Accordingly, the model includes the one- through four-quarter lags of *RER* (denoted as *RER1*, *RER2*, *RER3*, and *RER4*, respectively).

The other relative price term is the change in the real price of energy (ΔOIL), which controls for swings in energy prices. To distinguish the relative price from the cyclical effects of changing energy prices, the models include the t through $t-3$ lags of ΔOIL and the four-quarter lag of the year-over-year change in real energy prices (ΔOIL_{yoy4}). The real consumer price is used because the impact of price controls on wholesale and retail energy prices differed at

Net Interest: A Component or Determinant of Profitability?

A third measurement issue concerns profits and net interest. At one level, both profits and net interest are factor payments to capital, implying that profitability should be based on their sum, as in Feldstein and Summers (1977). Indeed, the large shift from equity to debt in the 1980s implies that the profits were lowered then simply because of a shift from one form of capital to another. The high degree of substitutability of debt and equity in the 1980s is further supported by the fact that much of the buildup in the 1980s in corporate debt reflected stock repurchases and the issuance by highly leveraged firms of lower grade bonds, whose risk profiles some analysts viewed as more like equity than traditional high-grade bonds. The subsequent deleveraging of the 1990s bolstered profits and lowered net interest, as illustrated in Figure 1.

However, debt and equity are not perfect substitutes. For example, net interest was temporarily boosted in the 1974-75 inventory-related recession, when firms borrowed more to finance unintended inventory buildups. In addition, the adoption of lean inventory techniques in the 1990s likely has reduced the cost of financing inventories. Hence, some of the past swings in the net interest reflect swings or shifts in (inventory) costs that negatively affect the economic returns to capital. Net interest payments also reflect swings in real interest rates associated with fiscal policy and/or monetary policy, such as the short-lived jumps during 1981-82 and 1989-90. In addition, movements in net interest may also reflect how swings in inflation affect corporate debt payments relative to income. For example, the net interest ratio may have been bolstered in the 1981-83 period when rapid and somewhat unanticipated disinflation slowed the growth of nominal corporate revenues relative to the high interest rates on existing bonds that some corporations had issued during the high inflation of the late 1970s and early 1980s. The net interest and profit measures used here also differ in that profits are measured on an after-tax basis, whereas net interest is measured on a before-tax basis. For these reasons, it may not be appropriate to simply add net interest and after-tax profits to measure the return to capital.¹

Nevertheless, shifts in debt and equity financing imply that the analysis needs to control for movements in net interest. With these considerations in mind, the ratio of net interest payments to output (*INTRAT*) enters as a right-side variable. The more that debt and equity are substitutes, the closer the coefficient on the net interest ratio should be to 1.

¹ While adding net interest to before-tax profits avoids this problem, shifts in corporate taxation make it preferable to use after-tax profit share in analyzing long-run profitability.

times, energy industry profits moved more closely with consumer prices, and the speed at which consumer energy prices react to wholesale energy prices has changed. From 1957 to 1996, the real price of energy is the ratio of CPI energy prices to the CPI. Before 1957, real energy prices are measured by the ratio of the energy prices in the personal consumption expenditures (PCE) deflator to the overall PCE deflator, where overlapping ratios based on the CPI and PCE in 1957:1 are used to break adjust the two series.

Regulatory variables. Because equation 2 omits potentially significant regulatory or tax actions, the empirical model assesses profit fluctuations stemming from two unusual government actions. One dummy, *D534* (= 1 in 1953:4), controls for the one-time plunge in profits during 1953:4. Firms booked profits out of that quarter because it was announced in September 1953 that an excess-profits tax from the Korean War would end in January 1954. Variables for subsequent quarters are not needed because firms apparently booked 1953 profits over several subsequent quarters, making it difficult to construct dummy variables for the “payback” effects.

Dummy variables are also tested to account for the Nixon wage–price controls, during which period price controls affected profit margins. Specifically, many firms were allowed to increase prices in response to cost increases only to the extent that their average profit margins did not exceed the average of the 1969–70 period. However, profit margins tend to be low during recessions, such as in the 1969–70 recession. Thus, the price controls effectively capped profit margins at low recessionary levels and delayed a cyclical recovery in profits (see *Economic Report of the President*, 1974, 91, and 1973, 65, respectively).¹⁰ Nine separate dummy variables are used for each quarter when the controls were in effect (1971:4–73:4, denoted *D714–D734*) because a single dummy for 1971:4–73:4 will not reflect how the different phases of the controls and their ability to bind changed in this economic recovery.¹¹

Inflation. To assess the impact of inflation on profitability, two inflation terms are tested: the year-over-year CPI inflation rate (*INFyoy*) and the four-quarter lag of this inflation measure (*INFyoy4*). Year-over-year measures are used because inflation may show some short-run persistence, whereas including eight separate quarterly lags instead would use up many degrees of freedom and make it difficult to observe any persistent and significant effects of inflation.

Results

Empirical model. Based on equation 2 and the discussion of possible regulatory and inflation effects on profits, the baseline empirical model used is

$$\begin{aligned} PRAT = & \text{constant} + \delta_1 DEPRAT + \delta_2 INTRAT \\ & + \sum_{i=0}^3 \alpha_i GDP_{t-i} + \alpha_4 GDPyoy4 \\ & + \beta_0 U_t + \beta_1 U_{t-1} \quad (\text{cyclical variables}) \\ & + \sum_{i=0}^3 \gamma_i \Delta OIL_{t-i} + \gamma_4 \Delta OILyoy4 \\ & \quad (\text{relative energy price variables}) \\ & + \sum_{i=1}^4 \zeta_i RER_{t-i} \quad (\text{real exchange variable}) \\ & + \phi D534_t \quad (\text{regulatory variable}), \end{aligned}$$

where Greek letters denote estimated coefficients. The baseline model excludes the inflation and Nixon wage–price dummy variables, as both are statistically insignificant. As a check that potential simultaneity bias is not altering the basic qualitative results, a version of the baseline model is also used, which replaces contemporaneous *DEPRAT* and *INTRAT* with their one-quarter lags, drops contemporaneous *GDP* and ΔOIL , and drops U_t but adds the two-quarter lag of U . Although some of the newly lagged right-side variables became statistically insignificant, the long-run trends in profitability are similar when profits are adjusted for the estimated effects of swings in the business cycle, oil prices, and exchange rates. Results from models with nonlagged variables are provided because profits are very sensitive to economic developments, and fits of models using contemporaneous values are better than those using lagged variables.

Regression results. Regression results are presented in Table 1, in which models 1 and 2 include time-trend variables, unlike models 3 and 4, and in which models 2 and 4 include inflation terms, unlike models 1 and 3. As this table indicates, the after-tax profit ratio is very sensitive to the business cycle in every model. Faster GDP growth boosts the profit ratio, as does a lower unemployment rate, which reflects tighter capacity. The negative sign on U_t and the positive sign on U_{t-1} reflect that profits are reduced by the current level of and change in the unemployment rate. From a technical perspective, the negative sum of the coefficients on the U lags reflects the negative effect of a lower *level* of capacity on profits, while the positive sign on the one-quarter lag actually reflects the negative effect of a *decrease* in capacity.¹²

Turning to relative price effects, positive

Table 1
Regression Results for Models of After-Tax Profit Share

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
constant	.167** (9.54)	.160** (8.92)	.167** (9.34)	.159** (8.40)	.168** (9.30)
<i>INTRAT</i>	-.804** (-4.17)	-.750** (-3.92)	-.807** (-3.95)	-.753** (-3.65)	-.767** (-3.76)
<i>DEPRAT</i>	-.248* (-2.16)	-.306** (-2.66)	-.247* (-2.15)	-.302** (-2.62)	-.248* (-2.15)
<i>GDP</i>	.163** (5.09)	.157** (4.95)	.160** (4.99)	.155** (4.88)	.162** (5.05)
<i>GDP1</i>	.136* (4.02)	.129** (3.79)	.134** (3.91)	.129** (3.72)	.133** (3.85)
<i>GDP2</i>	.094** (2.64)	.086* (2.39)	.097** (2.64)	.090* (2.42)	.090* (2.49)
<i>GDP3</i>	.093** (2.83)	.085* (2.56)	.098** (2.92)	.092** (2.66)	.091** (2.73)
<i>GDPyoy4</i>	.042+ (1.92)	.038+ (1.70)	.051* (2.18)	.047* (1.98)	.042+ (1.90)
U_t	-.0032** (-3.16)	-.0032** (-3.24)	-.0033** (-3.21)	-.0033** (-3.29)	-.0032** (-3.14)
U_{t-1}	.0024** (2.65)	.0024** (2.62)	.0024* (2.47)	.0023* (2.46)	.0023* (2.39)
ΔOIL	.032** (2.88)	.031** (2.86)	.033** (2.75)	.032** (2.70)	.034** (2.88)
$\Delta OIL1$	.025* (2.04)	.023+ (1.89)	.026* (2.01)	.024+ (1.86)	.027* (2.09)
$\Delta OIL2$	.058** (4.21)	.055** (4.00)	.059** (3.75)	.056** (3.57)	.062** (3.93)
$\Delta OIL3$	.042** (3.17)	.039** (2.86)	.042** (2.73)	.038* (2.47)	.046** (3.01)
$\Delta OILyoy4$	.026* (2.56)	.024* (2.36)	.021+ (1.76)	.019 (1.58)	.027+ (2.59)
<i>RER1</i>	-.0001 (-1.07)	-.0000 (-.64)	-.0001 (-1.18)	-.0001 (-.77)	-.0001 (-1.14)
<i>RER2</i>	-.0001 (-1.35)	-.0001 (-1.04)	-.0001 (-1.41)	-.0001 (-1.11)	-.0001 (-1.36)
<i>RER3</i>	.0000 (.17)	.0000 (.40)	.00003 (.30)	.0000 (.53)	.0000 (.15)
<i>RER4</i>	-.0003** (-3.67)	-.0002** (-3.07)	-.0003** (-3.54)	-.0002** (-2.98)	-.0003** (-3.68)
<i>D534</i>	-.016** (-7.32)	-.016** (-7.46)	-.016** (-7.26)	-.016** (-7.38)	-.016** (-7.33)
t	.00026 (1.31)		.00025 (1.16)		.00029 (1.38)
t^2	-.0000017* (-2.19)		-.0000016+ (-1.93)		-.0000018* (-2.19)
<i>INFyoy</i>			-.023 (-.48)	-.019 (-.38)	-.027 (-.55)
<i>INFyoy4</i>			.047 (1.11)	.049 (1.12)	
\bar{R}^2	.978	.977	.978	.977	.978
ρ	.876	.952	.877	.952	.882
<i>D.W.</i>	1.97	2.02	1.94	2.00	1.97
<i>Q(24)</i>	22.49	15.51	24.12	16.86	22.28
$F(t, t^2)$	3.27**		3.23**		3.22**
$F(INFyoy, INFyoy4)$			.75	.76	

**(*, +) denotes statistical significance at the 99 percent (95 percent, 90 percent) confidence levels.

signs on ΔOIL_{yoy4} and lags of ΔOIL_{t-1} suggest that higher oil prices boost profits. However, higher oil prices also lower output and thereby profitability. For this reason, the energy coefficient estimates do not reflect that real oil price increases probably hurt profits by inducing recessions, effects that are picked up by the cyclical variables. For this reason, it is best to interpret the energy coefficients as indicating that once the negative cyclical impact of higher oil prices is taken into account, higher real oil prices tend to boost profits. Put another way, nonfinancial corporate profits have tended to fall less in oil-induced recessions than in non-oil-induced recessions, once the overall magnitude of the recessions is taken into account by cyclical variables. One plausible explanation is that, after controlling for cyclical effects, energy company profits are apparently bolstered by capital gains on oil reserves by more than profits of oil-using companies are reduced, most likely because oil companies book substantial capital gains on oil reserves in the former type of recession.

With respect to the other relative price variables, results also indicate that a real exchange rate appreciation lowers the profitability ratio with about a four-quarter lag, often through reducing the competitiveness of traded-goods industries. Because most of the statistical significance of the real exchange rate variable reflects the large hump in the dollar's value in the mid-1980s, and because subsequent movements in the dollar's value have been smaller in size, the effects of exchange rates may be less precisely estimated than the standard errors and t ratios imply.

The estimated coefficients on the net interest ratio are worthy of more confidence, not only because net interest changes have occurred in several instances but also because the estimated coefficients are plausible. The fact that the coefficients are under 1 (roughly 0.8) for the after-tax profit share—coupled with results from other regressions (not shown), which indicate that the net interest ratio has a 1–1 effect on before-tax profit share—implies that after-tax profits and net interest are not perfect substitutes largely because of tax differences.

Results for regulatory variables are mixed. For example, the tax dummy for 1953:4 is always statistically and economically significant, indicating that the tax-cut announcement of 1953:4 cut the profit ratio by about 1.6 percentage points. On the other hand, the Nixon price-control dummy variables are jointly insignificant, as indicated by F statistics testing the

joint significance of these dummies in models corresponding to models 1–4.¹³

In contrast to the price-control variables, while the time terms (t and t^2) are jointly significant, their inclusion does not alter the qualitative regression results, as is reflected in Table 1, and the general movement in the adjusted profit ratio (not shown).

Perhaps at odds with the public finance literature on inflation and corporate taxation, the inflation variable is statistically insignificant (see models 3–5). This result also arises using the shorter sample of 1953:1–79:4. In other runs that omit statistically significant energy price variables, inflation is significant but with a counter-intuitive positive sign. This result likely reflects that, in the absence of energy price variables, CPI inflation is spuriously picking up changes in real energy prices stemming from omitted variable bias. Another reason for the lack of a negative and significant effect of inflation on profit share may be that changes in the tax code (particularly in 1981 and 1986) render the effect of inflation uneven over long samples. As a result, it may be difficult to find a statistically significant effect of inflation on profits without adjusting for tax code changes in some way. In light of this plausible explanation, the findings indicate that inflation may not add information about the after-tax share of profits in the presence of cyclical and relative price terms and in the absence of accounting for tax code changes.

Has the underlying trend in profits changed much?

Using the regression results, one can address the questions of whether and why the underlying trend in after-tax profit share has changed much in the 1990s. To do this, one can adjust profit share by subtracting from it the estimated impacts of the business cycle (GDP growth and unemployment rate effects), real oil prices, real exchange rates, regulatory variables, and swings in net interest. As shown in Figure 2, this adjusted profit ratio fell from the late 1970s to mid-1980s and since then has fluctuated in a range that is noticeably below that of prior decades.¹⁴ Interestingly, the profit performance of the 1970s differs little from that of the 1950s and 1960s on an adjusted basis, in contrast to the unadjusted data. This difference mainly reflects that the cyclical performance of the 1970s in terms of GDP growth and unemployment was noticeably worse than that of the prior decades and that interest rates were higher as well.

Table 2
Which Sectors Face Much Higher Competition Since the 1970s?

SIC Sector¹	Major Changes Boosting Competition in Particular Industries
Agriculture	————
Mining	<i>Oil & Gas:</i> Oil prices deregulated by a series of presidential executive orders beginning in 1979, and natural gas prices deregulated in phases by the Natural Gas Policy Act of 1978.
Construction	————
Manufacturing	Increased openness to trade, partly from GATT (1979, 1993), Canada–U.S. Free Trade Agreement (1989), and NAFTA (1994).
Transportation	<i>Trucking:</i> Liberalization of truck rates in the late 1970s and the Motor Carrier Reform Act (1980). <i>Airlines:</i> The Airline Deregulation Act (1978) allowed entry in 1982 and deregulated air fares in 1983. <i>Railroads:</i> Deregulated by ICC liberalization of rail rates in the late 1970s and the Staggers Rail Act (1981).
Communications	<i>Telephones:</i> Largely deregulated following the ATT court settlement of 1982. <i>Cable Television:</i> Deregulated in a series of FCC rulings in the late 1970s and by the Cable Television Deregulation Act (1984). <i>Telecommunications:</i> Partly deregulated by Telecommunications Act (1996).
Utilities	<i>Electricity:</i> Wholesale deregulation enhanced by Federal Energy Regulatory Commission rulings (1996).
Wholesale	————
Retail	<i>Department Stores:</i> Rise of discount store chains and electronic shopping.
FIRE (Finance, Insurance and Real Estate)	<i>Banking:</i> Partly deregulated by the Depository Institution Deregulation and Monetary Control Act (1980) and the Garn-St. Germain Depository Institutions Act (1982).
Service	<i>Health Care:</i> Innovations in the form of HMOs and managed care in the 1990s.

¹ Standard Industry Classification (SIC) of sectors at the 1-digit-level classification code.

SOURCES: Winston (1993) and author's compilations.

With respect to the late 1980s through the mid-1990s, virtually all of the run-up in the unadjusted profit ratio is due to swings in the business cycle and net interest, as demonstrated by the flatness in the adjusted profit ratio plotted in Figure 2. Much of the unadjusted rise stems from a huge decline in net interest since the late 1980s, which may largely be a long-lasting effect if the deleveraging of the early 1990s does not reverse itself (and also if real interest rates do not trend higher from the levels of the mid-1990s).

To a large extent, swings in the use of leverage reflect changing risk assessments and the development of new financial markets. For example, the rise of leverage in the 1980s partly reflected the further development of the junk bond market, more optimistic assessments of the risk posed by increased leverage, and the increased use of debt to finance an increase in corporate takeovers and mergers. The subsequent deleveraging of the 1990s likely reflected,

in part, how the unexpected recession and credit crunch of the early 1990s induced an upward reassessment of the risks of leverage and spurred a shift toward using stock swaps and relatively less debt to finance takeovers and mergers.

Because the impact of the recent net interest swing conceivably may persist for some time, whereas cyclical swings appear to be more short-lived, it is helpful to look at the after-tax profit share adjusted only for net interest effects, as shown in Figure 3.¹⁵ Consistent with the plot of profit share adjusted for cyclical and net interest swings in Figure 2, the net interest-adjusted profit share has moved in a lower range since the mid-1980s. Indeed, recent readings are well below the high points reached in the later phases of prior business expansions, such as in 1955, 1958, 1966, and the late 1970s.

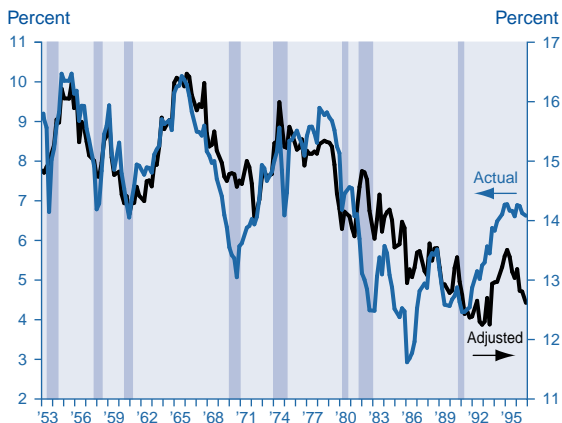
The fact that adjusted profits have moved in a lower range over the 1980s and 1990s raises the question, Why did profitability fall after the

1970s? One plausible, but unproven, explanation is that a number of factors have heightened the degree of competition facing firms. In turn, greater competition may have speeded up the pace of capital depreciation as firms more quickly replaced aging capital to match their competitors. This possible effect of greater competition may be reflected in the adjusted-profit ratio because the effect of depreciation was not subtracted from the raw-profit ratio in constructing the adjusted profit ratio in Figure 2. In addition, lower pricing power could arguably boost the shares of output going to other factors, such as variable costs, as firms extract less economic rent from other factors of production.¹⁶

What could have caused a rise in the degree of goods market competition since the 1970s? One often mentioned reason is heightened global competition. While trade flows imply that this should have been more of a factor in the 1970s, when the ratio of imports relative to GDP rose most prominently, import penetration during the 1970s may have induced U.S. firms to cut profit margins in the 1980s after losing market share in key traded-goods industries.

However, nontraded-goods industries have arguably become more competitive as well. For starters, a number of industries experienced greater competition stemming from deregulation in the late 1970s and early 1980s, including

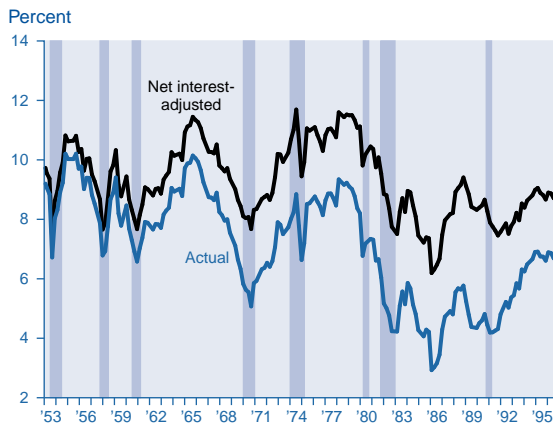
Figure 2
Adjusted and Actual After-Tax Profit Shares
Of U.S. Nonfinancial Corporations, 1953–96



NOTES: The adjusted profit share equals the actual profit share minus the estimated effects of swings associated with the business cycle, the Korean War profits tax, real exchange rates, real oil prices, and net interest, as estimated by model 1 in Table 1. The shaded areas denote recessions.

SOURCES: U.S. Bureau of Economic Analysis and the author's calculations.

Figure 3
Adjusted and Net Interest-Adjusted
After-Tax Profit Shares of U.S. Nonfinancial
Corporations, 1953–96



NOTES: The net interest-adjusted profit share equals the actual profit share minus the estimated effects of swings associated with net interest, as estimated by model 1 in Table 1. The shaded areas denote recessions.

SOURCES: U.S. Bureau of Economic Analysis and author's calculations.

the trucking, railroad, telephone, and airline industries (*Table 2*). More recently, the development of new information technologies may have enhanced competition in the information processing industry and reduced the costs to customers of shopping for the lowest prices. In addition, the development of new health care delivery organizations and changing cultural attitudes have enabled health care restructuring to open up the medical industry to more price competition in the 1990s (see Frech 1996).¹⁷

It is not certain why the adjusted after-tax profit share has not recovered to the range of the 1950s–70s. Nevertheless, developments suggest that increased goods market competition has played a role. For example, anecdotal reports in Federal Reserve Beige books in the 1990s suggest that inflation has remained low, in part because intense goods market competition has made it difficult for firms to raise prices (see Duca and VanHoose 1996).

Conclusion

This article finds that the rise in the after-tax profit share of nonfinancial corporations during the 1990s largely stems from a cyclical recovery in the U.S. economy and a decline in the net interest ratio often attributed to deleveraging and lower interest rates. In this sense, it is not clear that a long-lasting increase in the economic returns to capital has occurred, after accounting for the returns to debtholders

and equityholders and short-run, cyclical-related movements.

Although the financial strength of U.S. firms may not appear to have improved much based on the adjusted profit share variable, the deleveraging of the 1990s, as reflected in a lower net interest ratio, has improved the ability of firms to meet debt payments in the event of a downturn (see Bernanke, Campbell, and Whited 1990). Findings also suggest that much of the recent rise in the U.S. net investment rate owes less to a permanent jump in profitability and more to other potential factors, such as the business cycle, transitory rises in profits, or less crowding out of investment due to a lowering of the U.S. budget deficit. As for stock prices, the findings do not necessarily imply that stock prices are over- or undervalued, because profitability is only one of the three key determinants of equity values, the others being interest rates and risk preferences.¹⁸

Findings do, however, indicate that the after-tax profit share of nonfinancial corporations is not directly affected by inflation, although this result could stem from changes in the tax code, which may have altered the effect of inflation on profit share. Nevertheless, this finding does not necessarily imply that the *level* of profits is not hurt by inflation. In particular, low and stable inflation may indirectly boost the income going to each share of production, with factor income equaling a factor's income share multiplied by output. By creating an environment of stable and sustainable growth, boom-bust cycles in production are curtailed, which keeps output closer, on average, to its sustainable path and indirectly curtails cyclical swings in factor shares. Indeed, with respect to the former channel, growth and inflation have been smoother under the Federal Reserve's forward-looking low inflation policy in effect since the early 1980s.

Notes

I would like to thank, without implicating, Jean Zhang, Jeremy Nalewaik, and Justin Marion for providing research assistance and Mike Cox, Stephen Prowse, and Evan Koenig for making helpful suggestions.

¹ See Meyer and Kuh (1957) and Fazzari, Hubbard, and Petersen (1988).

² The Standard & Poor's 500-stock index is a component of the index of leading economic indicators, based on evidence that stock prices are indicators of future economic growth—for example, see Bosworth (1975) and Duffee and Prowse (1996). Stock market wealth has been shown to affect consumption (see Mishkin 1977)

and is used in many econometric models of consumption and investment, such as those used by the Federal Reserve Board and DRI/McGraw-Hill.

³ When compensation is deflated by an overall price index for consumption and business goods, rather than simply for consumption goods, real labor costs trend with productivity, as shown in the 1996 *Economic Report of the President*, 60–61.

⁴ Several studies of how exchange rates affect traded goods, such as Mann (1986), have found a role for imperfect competition in which exchange rates and pricing power are related.

⁵ Crabbe, Pickering, and Prowse (1990) analyze the shift in the 1980s from equity to debt.

⁶ Profits exclude capital consumption and inventory-valuation adjustments. Results are similar using before-tax profits—see Duca and VanHoose (forthcoming).

To include as many business cycles in the sample as possible, the after-tax profit ratio was created by splicing two series: one based on data revisions associated with the shift to chain-weighted GDP data affecting data starting in 1959:1 and the other based on earlier data not affected by this rebenchmarking. Both real and nominal data on corporate profits before 1959 will be revised when pre-1959 estimates of real chain-weighted GDP are released. Using overlapping data over 1959:1–4, a break-adjustment ratio was calculated. Multiplying the earlier data by this ratio eliminates a small level shift between 1958:4 and 1959:1 when the two series are spliced together. A similar procedure was used to create break-adjusted series for the depreciation ratio (*DEPRAT*) and the net interest ratio (*NETINT*).

⁷ For values of GDP variables involving pre-1959 data, growth rates were based on 1987 GDP because pre-1959 chain-weighted GDP data are not available. This splicing was done to include as many business cycles as possible to help estimate cyclical effects.

⁸ By including both lags, the model effectively includes current unemployment and the change in unemployment. To control for the 1994 change in the employment survey, which boosted the unemployment rate by 0.2, 0.2 is added to the unemployment rate before 1994:1.

⁹ The G–10, or Group of Ten countries, includes Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom, and the United States.

¹⁰ Gordon (1972, 411, Table 5, line 5e) estimates that the controls reduced the before-tax profit ratio by 1.25 percentage points for nonfinancial corporations over 1971:4–72:2.

¹¹ By contrast, the Korean War wage and price controls did not limit price rises based on profit margins, were imposed in an expansion, and did not cap profit margins at recessionary levels. By stabilizing the gap between prices and costs at its prewar, expansionary

level, these controls stabilized profit margins at levels typical of an economic expansion. Hence, unlike the Nixon price controls, dummies for the Korean War price controls are not needed.

¹² Denoting the coefficients on U_t and U_{t-1} as β_1 and β_2 , respectively, the unemployment effects can be reexpressed as $(\beta_1 - \beta_2)U_t + (\beta_2 U_t - \beta_2 U_{t-1}) \equiv (\beta_1 - \beta_2)U_t + \beta_2 \Delta U_t$.

¹³ The controls had a larger, but still jointly insignificant, effect on before-tax profit share in regressions not reported in the tables. The coefficients on the control variables in these regressions indicate that the controls depressed the before-tax ratios by about 1.25 percentage points, near Gordon's (1972) estimate for the effects in the first three quarters. The inclusion of the price-control variables is qualitatively significant in the before-tax runs because it affects the estimated cyclical effects. Specifically, the unemployment rate variables are only marginally significant when one excludes the price-control dummy variables from the model but very significant otherwise. However, this result is not too surprising, given that there is good reason to believe that the controls forestalled a cyclical recovery in profit ratios in the early 1970s.

¹⁴ Two different scales are used in Figure 2 because estimated effects of selected regressors reflect the means of these variables and because the model is estimated with a constant. For our purposes, it is the trend of adjusted profitability that matters.

¹⁵ Unlike the trend in the income share of before-tax profits plus net interest, the trend in the share of after-tax profits adjusted for estimated net interest effects (shown here) is less susceptible to being distorted by the big declines in direct corporate taxation since the 1960s.

¹⁶ Flatness in labor share suggests that the coefficient w in Equation 2 has not risen.

¹⁷ For example, health maintenance organizations (HMOs) are less vulnerable to malpractice suits than traditional health providers and are thus more able to adopt cost-saving practices. The increase in health insurance premiums in the 1980s induced firms to curb medical costs. Given the sensitivities surrounding health care and time needed to reform practices, the rise of HMOs lagged this need. The impact of HMOs on corporate competition is limited to the extent that health services are delivered by proprietorships and partnerships.

¹⁸ In theory, stock prices equal the present value of future earnings minus a "risk premium" to pay investors for risk, where the present value formula adjusts earnings for interest that could be earned from bonds. Thus, stock prices should rise when earnings' forecasts rise, interest rates decline, or risk premiums fall. The risk premium equals the price of the risk times the amount of risk, and seems to have declined since the 1970s (see Blanchard 1993). Aside from whether the price

of risk has fallen, one explanation for the apparent decline of the risk premium is that the volatility of stock returns—a measure of risk—has dropped since the 1970s (see Davis and White 1987 and Hickok 1996). It is unclear whether the risk premium has fallen enough to justify equity prices, because it is hard to disentangle the market price of risk from the actual degree of investment risk and to accurately measure each of these elements.

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Intellectual Property Rights and Product Effectiveness

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Y*et both developed and developing countries may have another reason to protect intellectual property—preserving product effectiveness.*

In the Uruguay round of multilateral trade negotiations, industrialized nations focused on using the General Agreement on Tariffs and Trade (GATT) to increase the protection of intellectual property rights in developing countries. Representatives of developed countries have long claimed that the protection of intellectual property in developing countries raises welfare for all parties (Vishwasrao 1994). In contrast, recent theoretical literature (Chin and Grossman 1988, Diwan and Rodrik 1991, Deardorff 1992, and Helpman 1993) argues that in an invention-importing country, where domestic invention is scarce or nonexistent, the protection of intellectual property can reduce the country's welfare and, in some cases, world welfare.

An important assumption of this literature is that the only return to society from protecting intellectual property is that it stimulates inventors to invent. In the developing world, however, human capital is assumed to be insufficient to produce many inventions. In addition, markets in the industrialized countries can be large enough that offering protection for intellectual property in developing countries adds little incentive for invention in the industrialized world.¹ Therefore, intellectual property protection is likely to imply monopoly costs to consumers in developing countries, without providing much stimulus for either local or foreign invention.² Using this approach, Nogués (1993) contributes empirical evidence that patent protection for pharmaceuticals can reduce welfare in developing countries.

Yet both developed and developing countries may have another reason to protect intellectual property—preserving product effectiveness. This reason for protection has not been addressed in previous literature. For a wide range of products, such as antibiotics, fungicides, herbicides, and pesticides, effectiveness diminishes with cumulative use. Ironically, such products have been among the least likely to receive intellectual property protection in nonindustrial countries (Butler 1990). Furthermore, developed countries generally let the protection of intellectual property rights for all products expire after a set period. Neither course is optimal.

To highlight the importance of preserving product effectiveness, we present a model in which the entire world shares a characteristic that most analysts ascribe only to developing countries: invention is not motivated by financial gain. Invention is costlessly bestowed through divine intervention, pure altruism, or dumb luck. Nonetheless, we show that protec-

tion of intellectual property remains necessary to optimize social welfare.

In the model, the absence of intellectual property protection permits a competitive market to develop for a product whose effectiveness diminishes with cumulative use. The deterioration of product effectiveness yields an externality cost that neither consumers nor producers take into account. As a consequence, product effectiveness is depleted at a faster than optimal rate, as resistant strains of bacteria, fungi, weeds, and pests develop.

In contrast, a monopoly producer, who owns the intellectual property right to such a product, has an economic incentive to preserve product effectiveness. The monopolist takes into account how one individual's use affects future effectiveness and consequent product demand. In doing so, the monopolist internalizes the externality and acts to preserve the product's effectiveness for future use. These findings have important implications for domestic patent protection, as well as for trade negotiations, which increasingly involve intellectual property rights.

An analytical model

The model characterizes the market for a product whose effectiveness diminishes with cumulative use. Invention is costlessly bestowed under two types of policy regimes: one without intellectual property protection and one with it. In the regime without intellectual property protection, all producers have equal claim on the invention, and they produce in a competitive market. In the regime with intellectual property protection, the invention is bestowed on a single producer, who gains a monopoly.

We begin by presenting demand and supply conditions for the product. We next develop the social-welfare-maximizing conditions for the market. We then compare these optimality conditions with the conditions that would prevail in a competitive market (with no intellectual property protection) and a monopolized market (with intellectual property protection). Finally, we conclude by comparing the competitive and monopolistic cases.

Demand. The quantity demanded at any moment in time (Q_t) is a function of price (P_t) and product effectiveness (E_t):

$$(1) \quad Q_t = Q(P_t, E_t),$$

where $\partial Q_t / \partial P_t < 0$ and $\partial Q_t / \partial E_t > 0$.³

Natural selection drives the process by which antibiotics, fungicides, herbicides, and

pesticides lose effectiveness through cumulative use. Effective use of such a product can destroy all or most of the target population of bacteria, fungus, weeds, or pests in a given ecological niche. In some cases, small numbers of the target population survive; these are strains that are resistant to the product in use. With the ecological niche cleared of competing members of the target population, resistant strains multiply and fill the niche. Eventually, resistant strains take over the niche and spread to other environments. As this happens, the antibiotic, fungicide, herbicide, or pesticide in use loses its effectiveness. Low-value uses accelerate the process in which a product loses effectiveness.

We simplify the process by assuming that product effectiveness at any moment in time is a decreasing function of cumulative consumption to date, X_t :

$$(2) \quad E_t = E(X_t),$$

where $\partial E_t / \partial X_t < 0$.

At any moment in time, cumulative consumption to date is defined:

$$X_t \equiv \int_0^t Q_\tau d\tau,$$

where τ is a dummy of integration for t (time), and Q_τ is the time derivative (rate of change) of X_t .

For analytical convenience, we rewrite demand as an inverse function, incorporating $E(X_t)$ in place of E_t :

$$(3) \quad P_t = D(Q_t, X_t),$$

where $\partial P_t / \partial Q_t < 0$, and $\partial P_t / \partial X_t < 0$.

Supply. Production occurs in n identical plants so the total quantity produced at any time (Q_t) is the number of plants (n) times the quantity produced in each plant (q):

$$(4) \quad Q_t = nq_t.$$

For an individual plant, the total cost of production (c) is a function of output (q):

$$(5) \quad c_t = c(q_t),$$

where marginal cost is positive—that is, $\partial c / \partial q > 0$. If output is distributed efficiently across all n plants, the aggregate total cost of production (C_t) can be written as a function of either Q or q :⁴

$$(6) \quad C_t = C(Q_t) = n \cdot c(q_t).$$

Social welfare maximization. The optimality conditions for social welfare maximization serve as a benchmark against which competition and monopoly can be compared. Social welfare is the present discounted value of the sum of consumer and producer surplus, evaluated over time:

$$(7) \quad PVSW = \int_0^{\infty} e^{-rt} \int_0^Q [D(\chi, X) - C_\chi] \partial_\chi \partial t,$$

where r is the interest rate, χ is a dummy of integration for quantity (Q), and C_χ is defined as $\partial C / \partial \chi$. (To simplify notation, we drop the time subscript; it is implicit.)

Pontryagin's maximum principle (and some manipulation) yields the optimality condition for social welfare maximization:

$$(8) \quad P = C_Q + \lambda.$$

Price (P) equals marginal cost (C_Q) plus a user cost (λ).⁵

The user cost represents the marginal value of preserving effectiveness for future periods as follows:

$$(9) \quad \dot{\lambda} = -e^{rt} \int_t^{\infty} (P_X e^{-r\tau}) \partial \tau,$$

where P_X is defined as $\partial P / \partial X$. If cumulative use reduces effectiveness, the price consumers are willing to pay for the product falls with cumulative production, $P_X < 0$, and the user cost is positive. If cumulative consumption does not alter effectiveness, then $P_X = 0$, the user cost is zero, and equation 8 becomes the familiar optimality condition in which price equals marginal cost.

The optimality conditions also indicate that the user cost can increase or decrease in value over time. In particular,

$$(10) \quad \dot{\lambda} = r\lambda + P_X,$$

which, given that $P_X < 0$, indicates that the user cost grows more slowly than the interest rate and declines if P_X is sufficiently negative.

The optimality condition expressed in equation 8 serves as a benchmark against which we compare the competitive and monopolistic cases.

Competitive case. In a purely competitive case, product effectiveness influences demand, but individual consumers and producers ignore the effect that individual consumption has on future effectiveness.

In the competitive case, inverse demand remains

$$(11) \quad P = D(Q, X).$$

For each firm, profit-maximizing conditions are obtained at the output where the firm's marginal cost equals the market price:

$$(12) \quad P = c_q.$$

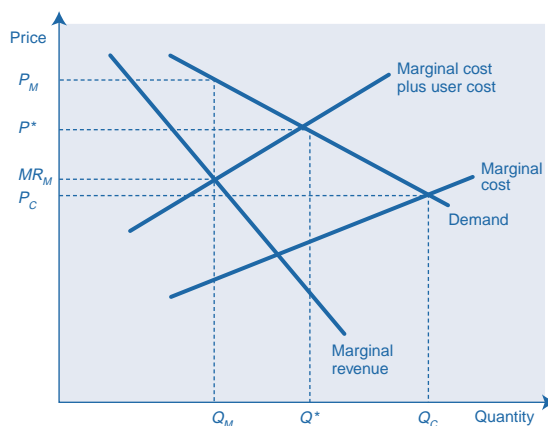
With n identical firms, market-clearing conditions require that the quantity demanded (Q) equals the total quantity produced ($n \cdot q$) at the market-clearing price (P). Given the cost function, equation 6, and $Q = nq$, it can be shown that C_Q equals c_q . Therefore, competition yields the familiar case in which price equals marginal cost:

$$(13) \quad P = C_Q.$$

This familiar case is not optimal, however. With consumers and producers ignoring the externality effects that consumption has on future effectiveness, the user cost found in equation 8 does not arise. Figure 1 illustrates the effect for a given demand curve at any moment in time. P^* and Q^* are the socially optimal price and quantity, respectively. For the given demand curve, the competitive market will yield a lower price, P_C , and a higher quantity, Q_C , than is socially optimal.

Comparing the dynamics of the competitive case with those of the socially optimal case is more complicated. Because the competitive market produces above the socially optimal rate, the demand curve shifts inward more rapidly than in the optimal case. At some point in time, demand in the competitive case will have shifted inward enough more that output,

Figure 1
Supply and Demand



Q , will be lower than if use of the product had always been optimal. This condition continues thereafter until product effectiveness goes to zero. Nevertheless, on the competitive time path, the cumulative consumption to date, X , will always be greater and the price will be lower than on the socially optimal time path.

Although intellectual property protection optimizes social welfare, the no-protection, competitive case can be made socially optimal by imposing a tax equal to the user cost or by identifying and banning low-value uses. The trouble with these solutions is that political time horizons and pressures may render political actors unwilling or unable to optimally defer product use either through higher prices or by proscribing low-value uses.

Monopolistic case. In the monopolistic case, the single seller has an incentive to consider how current consumption affects future effectiveness because the loss in effectiveness will be reflected in future sales. At the same time, however, a monopolist has the incentive to earn monopolistic rents by restricting output. The monopolist's profit is described as

$$(14) \quad \Pi = \int_0^{\infty} e^{-rt} [P(Q, X) \cdot Q - C(Q)] \partial t.$$

Pontryagin's maximum principle (and some manipulation) yields the monopolist's profit-maximizing condition as

$$(15) \quad P + P_Q \cdot Q = C_Q + \lambda.$$

Marginal revenue ($P + P_Q Q$) equals marginal cost (C_Q) plus the user cost (λ), where P_Q is the reduction in price required to sell the marginal unit. Equations 9 and 10 describe the user cost.

The presence of the user cost in equation 15 shows that the monopolist takes into account how current consumption affects future effectiveness. At the same time, however, the monopolist restricts output to obtain a monopoly rent. Figure 1 illustrates monopolistic behavior for a given demand curve at any moment in time. P^* and Q^* remain the socially optimal price and quantity, respectively. For the given demand curve, the monopolist sets a higher price, P_M , and sells a smaller quantity, Q_M , than is optimal. (The monopolist obtains a marginal revenue of MR_M .)

Comparing the dynamics of the monopolistic case with those of the socially optimal one is more complicated. Because the monopolist produces below the socially optimal rate, the demand curve shifts inward less rapidly than in the optimal case. At some point in time,

demand in the monopolistic case will have shifted inward enough less that output, Q , will be higher than if use of the product had always been managed in a socially optimal fashion. This condition will be maintained thereafter until product effectiveness goes to zero. Nevertheless, on the monopolistic time path, cumulative consumption to date, X , will always be lower and the price will always be higher than on the socially optimal time path.

One way to encourage the monopolist to allocate the product in a socially optimal manner is to establish a government-mandated price path in which the market-clearing price in each period is set equal to marginal cost plus user cost. With a set price path, the monopolist faces a perfectly elastic demand, and the incentive to restrict output disappears. Setting such a price path requires considerable information about demand and true production costs. In addition, such a policy could be rife with political influence because the monopolist would have an incentive to lobby government officials to raise the regulated price above the optimal level.

A more politic approach is to offer the monopolist a production subsidy equal to $-P_Q Q$. The government can avoid making a transfer to the monopolist by auctioning off permanent rights to monopolize the product's market with the government subsidy in place. Under competitive bidding, the monopoly rents and subsidies would be recaptured by the government. This policy can solve the allocation problem only if the government commitment to honor the contract is credible. We do not address time inconsistency problems here.

Conclusion: Competition versus monopoly

As shown above, neither competition nor monopoly is consistent with social welfare maximization when a product's effectiveness declines with cumulative use. A competitive industry would charge too low a price and deplete the product's effectiveness too rapidly. A monopolist would charge too high a price and produce too little of the product.

Our results are broadly consistent with those of Chin and Grossman, Diwan and Rodrik, Deardorff, and Helpman. They find that a competitive industry would provide too little invention, and a monopoly too little output, to maximize social welfare. But in their analyses, competition is preferable to monopoly when the welfare cost of the lost stimulus to invent is less than the welfare cost of restricted output.

In our analysis, competition is preferable

to monopoly when the welfare cost of failing to protect product effectiveness is less than the welfare cost of restricted output. Monopoly is preferable to competition when the welfare cost of failing to protect product effectiveness is more than the welfare cost of restricted output. We are unable to put prior values on these costs other than to say they depend on the elasticity of demand and the rate at which product effectiveness is depleted through cumulative use. In some cases, a monopoly that protects intellectual property may be preferable to competition, even when invention is costlessly provided.

If we simultaneously consider both the incentive to invent and the depletion of product effectiveness, competition will result in too little invention *and* too rapid depletion of product effectiveness. A monopolist will produce too little of the product.⁶ In addition, Vishwasrao shows that the gains to developed countries in avoiding monopoly pricing through patent infringement may be limited.⁷ As a consequence, the case for protecting intellectual property rights is substantially stronger for products whose effectiveness is depleted with cumulative use. Products with this characteristic—antibiotics, fungicides, herbicides, and pesticides—have been among the least likely to receive patent protection in developing countries.

Notes

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- ¹ Taylor (1994) underscores the importance of incentives by showing that an invention-importing country can slow technological progress and make both itself and the world worse off when its failure to protect intellectual property developed elsewhere reduces the incentive to invent elsewhere.
- ² Diwan and Rodrik (1991) and Frischstak (1990) find that developing countries can improve their welfare by protecting intellectual property when they have a strong demand for a product that is not particularly useful in industrialized countries.
- ³ Over some ranges of effectiveness, consumers may increase their use of an antibiotic, fungicide, herbicide, or pesticide to offset reduced effectiveness. We abstract from this case by assuming that they would do so only at a reduced price. Therefore, at a given price, consumption falls with effectiveness.
- ⁴ For simplicity, we assume the same number of plants in all three cases. This assumption simplifies the analysis without affecting the results.
- ⁵ This optimality condition should be familiar to those who are versed in the economics of exhaustible nat-

ural resources. See Dasgupta and Heal (1979).

- ⁶ The monopolist's incentive to restrict output may be limited, however, by the potential entry of competing inventions. The extent of competition may depend on the breadth of patent protection and the cost of imitation. See Baumol and Willig (1981), Baumol, Panzar, and Willig (1988), Gallini (1992), Gilbert and Shapiro (1990), and Klemperer (1990).
- ⁷ Vishwasrao shows that a lack of patent protection can adversely affect the licensing of low-cost technologies to developing countries and that strategic behavior on the part of firms in developed countries can erode the gains developing countries reap through patent infringement.

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Is the Business Cycle of Argentina “Different”?

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Nominal factors do not seem to be able to account for any significant fraction of the business cycles of Latin American countries in general, and of Argentina in particular. Perhaps for this reason it is time to give real factors their fair chance to do the job.

Societies would prefer a steady growth path for their national income of, say, 3 percent every year to one that delivers a 3 percent growth rate on average, but with zigzags from, say, 12 percent one year to -6 percent the next. Consequently, they typically demand that policymakers eliminate undesired economic fluctuations.¹ It is not surprising, then, that the understanding of business cycles has always captured the interest of economists and has inspired some of their best work.

The work of John Maynard Keynes and Milton Friedman went a long way in defining the terms and identifying the issues that a successful theory of economic fluctuations ought to address. Despite the much-advertised difference between the schools of thought inspired by these scholars, their work agrees on something very important: nominal factors, such as the money supply, interest rates, and price rigidities, play the most important role in explaining economic fluctuations.

As is well known, the 1970s were not kind to the Keynesian interpretation of business cycles. This interpretation predicts that the rising inflation rates of that decade should have been associated with declining unemployment rates, not with the rising rates actually observed. Empirical and theoretical research did not treat the “rival” school much better. Sims (1980), for example, showed evidence that seems to contradict some versions of the monetarist theory.

Initially, the theoretical developments inspired by these failures kept nominal factors as the paramount force behind economic fluctuations. In fact, in Lucas (1972), the first and perhaps most celebrated application of the novel approach to macroeconomic analysis for which Robert Lucas received the 1995 Nobel Prize, the money supply still plays a crucial role for the business cycle. Thus, economists were surprised when Kydland and Prescott (1982) showed that one could account for two-thirds of the U.S. economic fluctuations with a dynamic stochastic general equilibrium model from which nominal variables were totally absent—that is, a model without any money in it.

Kydland and Prescott obtained this result using a variation of the same basic theoretical model economists had been using time and again to study economic growth issues. Unifying theories—that is, theories that can simultaneously explain seemingly unrelated phenomena—are usually welcome in science. What many economists found attractive about the Real Business Cycle (RBC) theory proposed by Kydland and Prescott was that, for the first

time, a business-cycle theory pointed to the possibility that the same analytical tools used to address economic growth issues could be used to address business-cycle questions as well. This may explain why these economists regarded Kydland and Prescott's findings persuasive enough to begin seriously exploring the hypothesis that "real" factors, rather than nominal ones, are a prevalent driving force behind economic fluctuations.² Although real or supply-side factors, such as the amount of resources used by the government, tax policies, technological changes, government regulations, modifications of financial intermediation rules, and even political shocks signaling possible changes in property rights, may appear to be the obvious candidates to explain business cycles, this was not that clear a short while ago.

The process of verifying, sharpening, or refuting the real-shock account of business cycles has generated a large body of theoretical and empirical research concentrated, so far, on developed countries. This is unfortunate, because the evidence suggests that economic fluctuations are particularly severe in developing countries. Understanding why this occurs could lead to ways to make the business cycles of these countries at least as smooth as those of developed ones. What makes the study of Latin American countries' business cycles particularly interesting is the claim that economic fluctuations in those countries have been driven by nominal factors. Science makes progress precisely when it encounters observations that the prevailing paradigm cannot explain. Therefore, there seems to be a compelling need to confirm the alleged anomalies by answering the question, Are business-cycle regularities in Latin America really all that different from those in the United States and in Organization for Economic Cooperation and Development (OECD) and other European countries?

This article focuses this question on Argentina, with the hope of making a modest contribution to the understanding of the business cycles of Latin American countries in general. For example, if Argentina's business-cycle regularities are similar to those of the United States or Europe, then the business cycles of all these countries may be manifestations of essentially the same phenomenon. Therefore, real factors could play an important role in accounting for Argentina's business cycles, just as, according to recent research, they do in the United States and Europe.

By contrast, if Argentina's business cycles show important anomalies with respect to the

evidence available for other countries, then the possibility of real factors playing an important role in its business cycle diminishes. In this case, existing interpretations emphasizing the role of nominal variables in Latin America may regain the prominence they had in business-cycle theories until the 1970s. Allowing for comparisons with the empirical evidence for other countries, this article examines the Argentinean business-cycle regularities with the same methodological approach used in previous studies for the United States and several European countries.

In the following section, we present the evidence other authors have used to support the contention that nominal factors have driven the business cycles in Latin America and provide reasons to doubt the robustness of those findings. We also suggest that the data require further systematic scrutiny before economists can conclude with some confidence that business cycles in Latin American countries, and particularly in Argentina, differ in nature from those observed in the United States and in OECD and other European countries. Next, we undertake one such systematic study by presenting, as the availability of data permits, the Argentinean counterpart of the statistics researchers have used to describe the business cycles of the United States and several European countries. We then compare the statistics for Argentina with those of other countries and state the implications that result from analysis of cross-country similarities and differences. The last section summarizes our conclusions.

The state of the business-cycle debate in Latin America

The understanding of the Latin American business cycles has not escaped the view that nominal shocks are the predominant cause of economic fluctuations. This view still influences the thinking on many Latin American economic problems. This thinking is particularly noticeable in the inflation stabilization literature.

One of the most serious economic problems many Latin American countries have faced in past decades has been persistent, high inflation.³ Therefore, the quest to find the best anti-inflation policies has inspired a large body of research on this problem. The monetarist influence in that literature is evident in its contention that nominal factors (such as changes in the nominal exchange rate regime) were the only systematic force driving economic fluctuations around the time the stabilization programs were implemented. For example, the conventional

wisdom in Latin America is that anti-inflation programs using the exchange rate as a nominal anchor (exchange-rate-based stabilization, or ERBS, programs) have been able to reduce the inflation rate without causing the initial output losses associated with programs that use some monetary aggregate as a nominal anchor (money-based stabilization programs).⁴

Of course, a theory for stabilization programs is not the same as a theory for the business cycle. But there should be some consistency among them. For example, a finding that nominal shocks do not have important real effects during Latin American stabilization programs would make it harder to maintain the monetarist view that such factors may have been important at any other point of the business cycle. And this is precisely what we find problematic: a reexamination of the evidence on ERBS programs shows that it is far from clear that the adoption of the exchange rate as a nominal anchor has been responsible, as the literature claims, for the economic fluctuations observed during those programs.

Figure 1 illustrates the consumption growth rates for the ten ERBS programs studied by Végh (1992). The vertical line indicates the year or quarter in which the ERBS program started.⁵ Casual inspection of the plots suggests that only in the first four cases did consumption experience the upward jump that theory predicts should occur upon announcement of ERBS programs.⁶ However, this theoretical prediction did not materialize in the remaining six cases. In particular, in none of these six did consumption grow faster than in the immediately preceding period. Instead, in four of the six cases, consumption growth was basically the same immediately before and immediately after the announcement of the corresponding ERBS program. In two of the four, the so-called consumption boom preceded the announcement. In the other two, there was no consumption boom whatsoever: consumption continued falling at approximately the same rate as before the ERBS programs began. Furthermore, in the last two cases, the ERBS program was followed instead by a consumption bust.

Therefore, the timing, intensity, or direction of consumption growth for the countries in Végh's study, after most ERBS programs began, appears to differ from that implied by the ERBS theory.

In this sense, at least four of the plots in Figure 1 (Chile, February 1978; Argentina, December 1978; Argentina, June 1985; and Israel, July 1985) could be interpreted using the non-

monetarist approach: the dynamics of output immediately after the announcement of an ERBS program were mere continuations of upswings or downturns that had begun earlier. In these four cases, forces other than the adoption of a fixed or pegged exchange rate were already driving the business cycle when the ERBS programs began. But such conclusions from the casual reading of two-dimensional plots would be premature.⁷ We are more persuaded, instead, by the more thorough empirical effort of Rebelo and Végh (1995), who conclude that monetarist-inspired theoretical models of ERBS programs are quantitatively incapable of replicating any significant fraction of the economic fluctuations associated with such programs.

The evidence on ERBS programs, both from casual plot readings and from the work of Rebelo and Végh, poses a serious challenge to monetarist theories of Latin American business cycles: if nominal exchange rate shocks in Latin America seem to have failed to produce the noticeable and consistent effects on consumption and other real variables predicted by monetarist-inspired theories precisely when they were given the best shot at it, how could they have significant real effects at other times?⁸

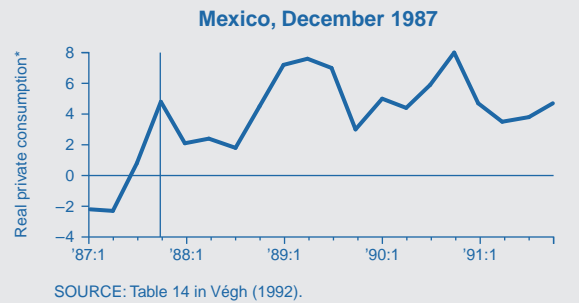
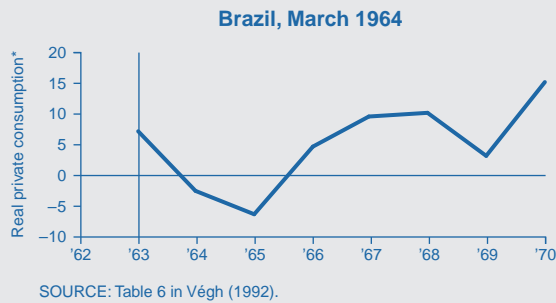
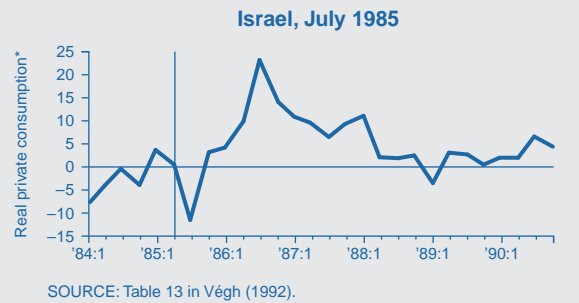
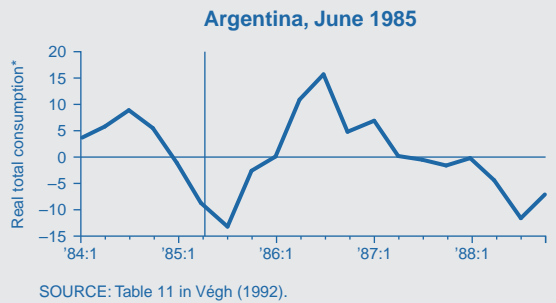
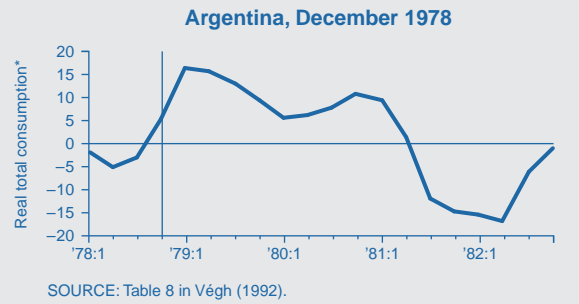
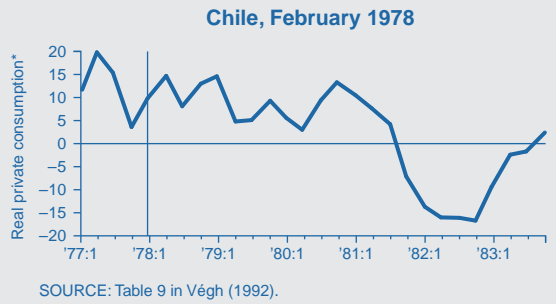
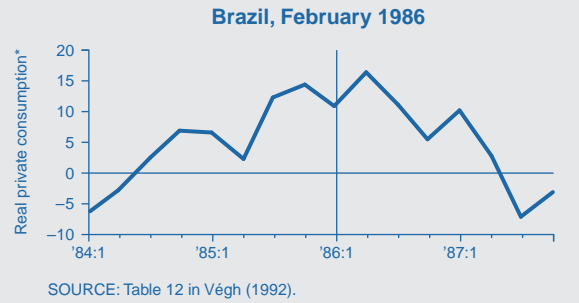
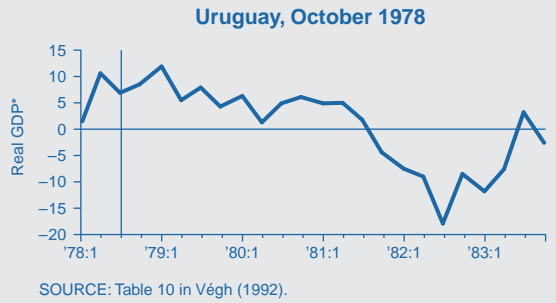
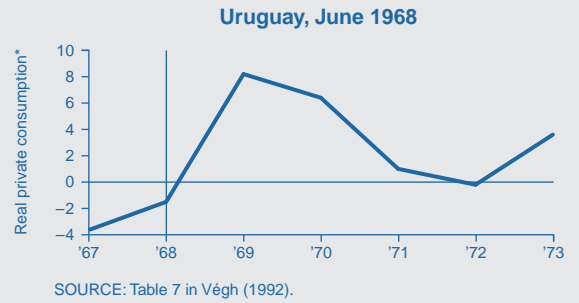
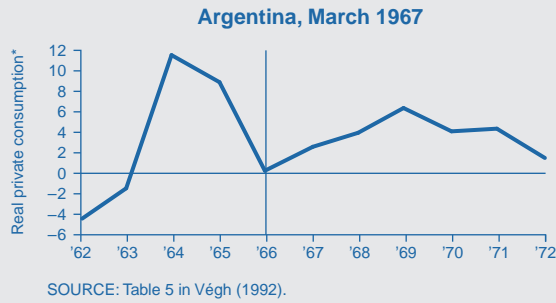
A natural next step in the research agenda is to pay more attention to real shocks as a potentially important source of the economic fluctuations observed in Latin American countries, including fluctuations observed during inflation stabilization programs.⁹ In principle, there is no reason the assessment of the quantitative importance of such shocks in Latin America could not be accomplished with the same kind of dynamic stochastic general equilibrium models the RBC tradition has used to that effect for the United States and other developed countries.

But such a research program must start by describing the data with a systematic, atheoretical methodology.¹⁰ The remaining sections of this article make a modest attempt in that direction by describing the business-cycle regularities of Argentina without imposing theoretical priors to the data.¹¹

Business-cycle regularities for Argentina

Some caveats about the data. National account data in Latin America are not as reliable as their U.S. and OECD counterparts.¹² In fact, because of frequent methodological changes and corrections of previous errors, the reported series may change substantially from one national account estimate to the next. This is indeed the case for Argentina. For example,

Figure 1
ERBS Programs



* Growth in percent with respect to the same period of the previous year.

volatility of consumption relative to output is substantially lower in the national accounts estimate at 1986 prices (released at the end of 1996) than in the previous estimates at 1970 prices.

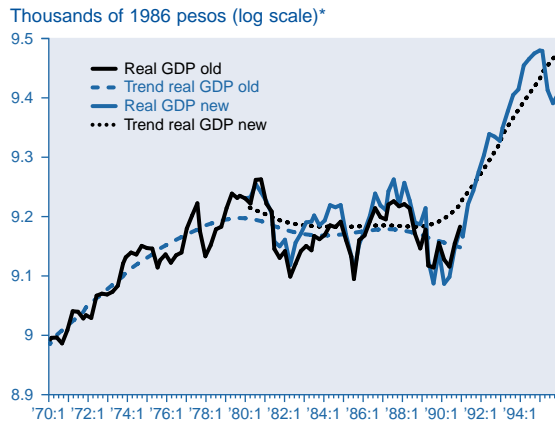
The example above emphasizes that in dealing with countries such as Argentina, researchers should heed the usual warning to appropriately weigh the quality of the data before taking for puzzles anomalies that in reality may be mere statistical artifacts. For that reason, we report the business-cycle regularities obtained from using two different estimates of GDP and its components. The comparison of the results from each data set will eventually give some idea of the confidence one should place on the business-cycle regularities of Argentina reported here or elsewhere (for examples, see Kaufman and Sturzenegger 1996 and Carrera, Féliz, and Panigo 1996).

One estimate (the “old” estimate), in constant prices of 1970, covers the 1970:1–90:4 period and was prepared by the Central Bank of Argentina. We obtained this estimate from the FIEL (Fundación de Investigaciones Económicas Latinoamericanas) data bank. The other estimate (the “new” estimate), in constant prices of 1986, covers the 1980:1–95:4 period. The figures for this estimate were taken from the publication *Oferta y Demanda Globales, 1980–1995*, prepared by the Dirección Nacional de Cuentas Nacionales. Notice that these two estimates overlap only during the 1980:1–90:4 period.¹⁵

Methodology. We characterize the business-cycle regularities of Argentina using Kydland and Prescott (1990) as a guide. Their procedure is inspired by Lucas (1977), who defines the business-cycle component of a variable as its deviation from trend. Kydland and Prescott define the trend of a variable as that which results from applying the Hodrick–Prescott filter (HP filter) to the raw data. Informally, this filter produces trends that are “close to the one that students of business cycles and growth would draw through a time plot” (Kydland and Prescott 1990).¹⁴ Application of the HP filter to Argentinean GDP, for example, produces the trend represented by the smoother curves in Figure 2.^{15,16}

Except for net exports, all variables in the tables of this article are expressed in natural logarithms, as is standard in the business-cycle literature.¹⁷ Since it is not possible to compute the logarithm of negative values, variables that can take on such negative values, such as net exports, were expressed instead as ratios to GDP. All the variables were seasonally adjusted using the X-11 procedure.

Figure 2
Real GDP, Old and New Estimates



* For visual effect, the old estimates have been rescaled so that their level is the same as for the new estimates in 1980:1.

SOURCES: Dirección Nacional de Cuentas Nacionales for new estimates; FIEL for old ones; authors' calculations for trends.

The tables report statistics that measure (1) the direction of the movements of a variable compared with that of real GDP (*procyclical*, in the same direction; *countercyclical*, in the opposite direction; *acyclical*, when there is no clear pattern); (2) the degree to which the variable follows the movements of real GDP (contemporaneous correlation); (3) the amplitude of fluctuations (volatility or relative volatility); and (4) the phase shift—that is, whether a variable changes before or after real GDP does (leads or lags the cycle, respectively.)

The statistics *volatility* corresponds to the standard deviation of the percentage by which the cyclical component of a variable deviates from trend. The statistics *relative volatility* is the ratio between the volatility of the variable of reference and the volatility of real GDP.

Real facts for Argentina

Output and its components: GDP. Table 1 reports statistics for real GDP and its major components. The first striking feature of the table is the high volatility of real GDP. According to the new national account estimates, the percentage standard deviation from trend of Argentina's real GDP is roughly 2.5 times larger than for the United States. Real GDP volatility is also high in the old national account estimates, but within the range observed in European countries such as Greece (2.85), Portugal (3.05), and Luxembourg (3.2).^{18,19}

Total consumption. An important caveat in interpreting the consumption evidence is that in Argentina's national account, consumption is computed as a residual, which casts consider-

Table 1
Cyclical Behavior of Real GDP and Its Main Components in Argentina and Other Countries

	Argentina (new national account estimates) 1980:1–95:4	Argentina (old national account estimates) 1970:1–90:4	United States ¹	OECD, G–7, and other European countries ²
Real GDP volatility ³	4.59	3.06	1.71	.90 to 3.20
Total consumption	Procyclical	Procyclical	Procyclical	Procyclical
Contemporaneous correlation	.96	.84	.82	.1 to .83
Relative volatility ⁴	1.19	1.69	.73	.66 to 1.46
Phase shift	Coincidental	Coincidental	Coincidental	Coincidental ⁵
Gross fixed investment	Procyclical	Procyclical	Procyclical	Procyclical
Contemporaneous correlation	.94	.71	.90	.15 to .90
Relative volatility ⁴	2.90	3.44	3.15	2.30 to 5.63
Phase shift	Coincidental	Coincidental	Coincidental	Coincidental
Government consumption indicator	Acyclical ⁶	Acyclical ⁷	Acyclical	Acyclical
Contemporaneous correlation	.20 ⁶	.24 ⁷	.05	–.23 to .27
Relative volatility ⁴	3.19⁶	4.43⁷	1.21	.36 to 1.28
Phase shift	Lagging ⁶	Lagging ⁷	Lagging	—
Net exports ⁸	Countercyclical	Countercyclical	Acyclical	Acyclical/countercyclical
Contemporaneous correlation	–.84	–.62	–.28	–.01 to –.68
Volatility ³	2.28	3.27	.45	.5 to 1.33
Phase shift	Coincidental	Coincidental	Leading	—
Imports	Procyclical	Procyclical	Procyclical	—
Contemporaneous correlation	.81	.71	.71	—
Relative volatility ⁴	4.05	5.61	2.88	—
Phase shift	Coincidental	Coincidental	Coincidental	—
Exports	Countercyclical	Countercyclical	Procyclical	—
Contemporaneous correlation	–.61	–.21	.34	—
Relative volatility ⁴	1.68	3.21	3.23	—
Phase shift	Coincidental	Coincidental	Lagging	—

¹ Statistics are from Kydland and Prescott (1990).

² Statistics are from Backus, Kehoe, and Kydland (1995) and Christodoulakis, Dimelis, and Kollintzas (1995).

³ Percent standard deviation from trend.

⁴ Ratio of volatility of the variable and the volatility of real GDP.

⁵ Except in France, where, according to Christodoulakis, Dimelis, and Kollintzas (1995), it leads the cycle.

⁶ For the period 1980:1–89:4.

⁷ For the period 1970:1–89:4.

⁸ Trade balance as percentage of GDP.

NOTE: Seemingly anomalous statistics are in bold type.

SOURCES: Authors' calculations, using the sources reported in the text.

able doubt on the nature of the anomalous behavior of consumption that we discuss below.

The volatility of real GDP and the relative one for consumption imply that the volatility of this real GDP component is higher than that for the United States or European countries. But this anomaly is not all that remarkable because it results directly from the reported high volatility of real GDP and the fact that consumption and GDP are highly correlated.

Perhaps what is remarkable is that the volatility of consumption is larger than that of output. Although theoretically the opposite should hold, this excess relative consumption volatility is within the ranges observed in Japan and some European countries.²⁰ More specifically, according to the new national account

estimates in Table 1, Argentinean consumption is 19 percent more volatile than GDP. This is not uncommon by international standards. Backus, Kehoe, and Kydland (1995) report that the corresponding figure is 14 percent for Austria and 15 percent for Japan. According to Christodoulakis, Dimelis, and Kollintzas (1995), it is as high as 46 percent for the Netherlands.²¹

By contrast, relative consumption volatility does exceed international standards for the old national account estimates. A consumption volatility 70 percent larger than that of output is indeed hard to explain. Some studies have attributed this excess volatility to the presence of credit constraints.²² However, there are reasons to be skeptical about this explanation because in models with credit constraints, con-

sumption is not as smooth as it would be otherwise, but it is still typically smoother than income.²³

In considering the correlation between output and consumption, it is the figure for the old national account estimates that is normal and the one for the new national account estimates that is abnormal. The correlation of 0.84 for the old national account estimates is about the same as the 0.83 correlation reported for Canada—the highest correlation among the countries reported in Backus, Kehoe, and Kydland (1995) and Christodoulakis, Dimelis, and Kollintzas (1995). This means that the 0.96 correlation between deviations from trend of consumption and GDP reported for the new national account estimates is unusually high by international standards. It seems to be high even by Latin American standards, as that correlation is 0.91 for Mexico (our own estimates for the 1980:1–95:4 period) and 0.88 for Uruguay (for the 1976:1–93:4 period; see Kamil Saúl 1997).

Theory predicts that such correlation should be higher the more permanent the shocks are to income. Therefore, the high correlation observed for Argentina might be an indication that its business cycle is indeed different in the sense that shocks are more permanent there than in other countries. We suspect, however, that most business-cycle models, monetarist or real, will have a hard time accounting for this high correlation without, at the same time, failing to accommodate other key regularities of the Argentinean business cycle. Nonetheless, there are reasons to be cautious about the magnitude of the contemporaneous correlation between detrended consumption and GDP in Argentina. One reason, of course, is that the significant discrepancy between the correlations obtained with the two national account estimates points to the possibility of important measurement errors. This possibility becomes even more apparent when we recall that consumption in Argentina, as in many developing countries, is calculated as a residual. This residual includes government consumption—for which Argentina produces no separate quarterly estimates—and, in the case of the new national accounts estimate, changes in inventories, for which there also is no separate estimate.

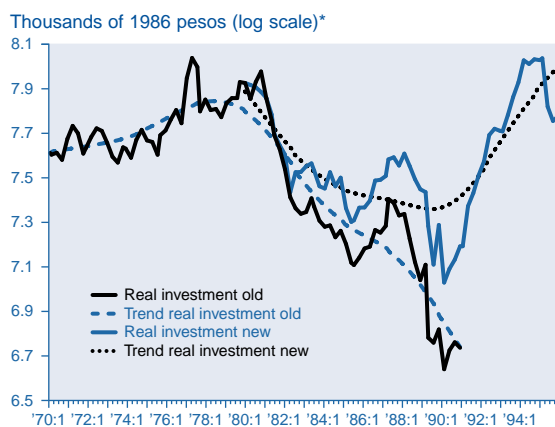
An additional methodological source of spurious correlation between consumption and output is the way output in Argentina is allocated between consumption and investment. Many goods—such as automobiles, electronics, furniture, computers, and telecommunications

equipment—may be used for consumption or investment purposes. Unfortunately, Argentina does not have the information necessary to determine the categories in which these goods are being applied. To circumvent this problem, the production of many items is imputed to both consumption and investment according to fixed coefficients constructed with information available only for the base year. For example, 80 percent of automobile production is always imputed to consumption and 20 percent to investment. The same procedure is applied to imports and to the output of many other industries that produce goods that can be used for both investment and consumption purposes.²⁴

Of course, the proportions in which many goods are purchased for consumption or investment purposes change over the cycle. As a result, the fixed-proportion methodology used for Argentina's national account estimates will distort the true underlying features of the business cycles. In particular, with this imputation method, part of the investment booms will show up misleadingly in the data as consumption booms.²⁵ Because investment is highly correlated with output, the fixed coefficients method of imputation can artificially increase the measured correlation between consumption and GDP. This problem could be especially serious in the new national account estimates that include the unusual investment boom of the 1990s (*Figure 3*).

In summary, there are reasons to be cautious about the interpretation of the high correlation between consumption and output for

Figure 3
Real Gross Fixed Investment,
Old and New Estimates



* For visual effect, the old estimates have been rescaled so that their level is the same as for the new estimates in 1980:1.

SOURCES: Dirección Nacional de Cuentas Nacionales for new estimates; FIEL for old ones; authors' calculations for trends.

Table 2
Cyclical Behavior of Argentinean and U.S. Labor Inputs and Productivity

	Argentina (new national account estimates) 1980:1–90:4	Argentina (old national account estimates) 1970:1–90:4	United States ¹
Industrial real GDP volatility ²	5.57	5.84	4.18
Real GDP	Procyclical	Procyclical	Procyclical
Contemporaneous correlation	.95	.90	.86
Relative volatility ³	.69	.52	.36
Phase shift	Coincidental	Coincidental	Coincidental
Total hours	Procyclical	Procyclical	Procyclical
Contemporaneous correlation	.76	.77	.86
Relative volatility ³	.89	.70	.73
Phase shift	Coincidental	Coincidental	Coincidental
Employment	Procyclical	Procyclical	Procyclical
Contemporaneous correlation	.55	.49	.79
Relative volatility ³	.66	.56	.60
Phase shift	Lagging	Lagging	Lagging
Hours per worker	Procyclical	Procyclical	Procyclical
Contemporaneous correlation	.70	.68	.77
Relative volatility ³	.43	.38	.20
Phase shift	Coincidental	Coincidental	Coincidental
Productivity	Procyclical	Procyclical	Procyclical
Contemporaneous correlation	.48	.72	.71
Relative volatility ³	.66	.65	.52
Phase shift	Coincidental	Coincidental	Coincidental

¹ The statistics correspond to the 1959:3–94:4 period and were constructed by the authors using a series of value added by the manufacturing sector and a corresponding series of employment and hours worked in that sector published by the Bureau of Labor Statistics (BLS) until 1994. The quarterly measure of industrial value added was taken from CITIBASE and corresponds to the “fixed-weighted gross product originating” series for manufacturing produced by the BLS (see Gullickson 1995 for details).

² Percent standard deviation from trend.

³ Ratio of volatility of the variable and the volatility of real industrial GDP.

NOTE: Seemingly anomalous statistics are in bold type.

SOURCES: Authors' calculations based on sources in the text for national account estimates and on FIEL for labor market data.

the new national account estimates reported in Table 1. Better data are needed before one can confidently establish that this unusually high correlation is indeed an anomaly by international standards.

Gross fixed domestic investment. The magnitude and sign of the statistics for this component (plotted in Figure 3) are in line with those observed in other countries. It is particularly noteworthy that the relative volatility of this real GDP component is close to that for the United States.

Government consumption. As stated, Argentina does not have separate quarterly national account estimates for government consumption. The disorganization of public accounts in combination with the high inflation rates that prevailed during the period have made estimation of such a series very difficult.

However, the same high inflation that prevents the construction of reliable government consumption estimates also suggests that fiscal policies may have played an important role in

the Argentinean economy. Therefore, we believe it is important to report statistics—albeit partial—for an indicator that shows the government consumption contribution to GDP at quarterly frequencies. Figures for treasury payroll payments are available on a monthly basis for the 1970–89 period, so we choose this variable as a potential indicator of fiscal policy. We must emphasize, however, that these disbursements represent only a fraction of all such payments in the Argentinean public administration.

The statistics in Table 1 show that the relative volatility of our real government consumption indicator is well above international standards. It is also acyclical, a feature that characterizes government purchases in the United States as well. This acyclicity seems to be anomalous by Latin American standards (see Talvi and Végh 1996).

Trade balance. Some of the statistics for Argentinean net exports (trade balance as a percentage of GDP) are in line with the international evidence: net exports are countercyclical,

as in several OECD countries, although the Argentinean contemporaneous correlation with output is on the high end of the range. By contrast, the volatility of this component seems to be abnormally high by international standards. A similar situation arises with imports: they are procyclical, as in the United States, but exhibit a much higher volatility relative to output. Finally, almost all of the statistics for exports are out of line with those for the United States.

One caveat in analyzing the trade balance components of GDP is that Argentinean imports and exports are subject to considerable measurement errors because Argentina used open or hidden forms of exchange rate controls during substantial portions of the period under analysis. During these periods, the private sector had incentives to understate exports and overstate imports in order to exploit the differential (which eventually became large) between the often multiple official exchange rates and the higher exchange rate usually prevailing in the black market.

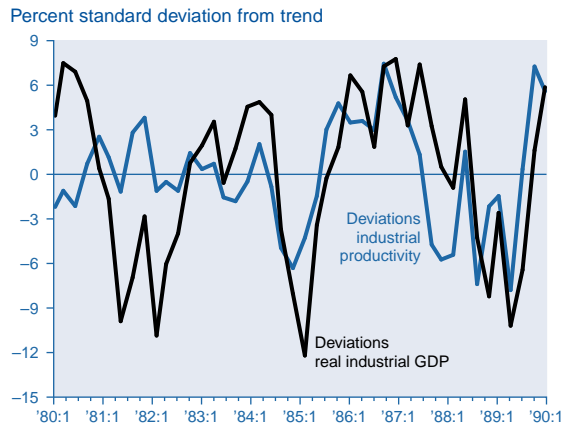
Labor inputs. Table 2 presents facts on aggregate production and labor input for the old and new national account estimates. Because we are trying to follow the methodological approach in Kydland and Prescott (1990) as closely as possible, we would like to replicate in our Table 2 all the statistics those authors report in their Table 1. Unfortunately, lack of data has prevented us from achieving the same results so far: there are no reliable quarterly estimates of capital input. And information on employment and hours worked is available only for the manufacturing sector, whose value added represents a 25 percent average of total GDP in the 1980–95 period.

For these reasons, we report in Table 2 the correlation and relative volatility of labor inputs with respect to real industrial GDP, rather than aggregate overall real GDP, used in Tables 1 and 3. We also construct similar measures for the United States. To give some idea of how well these series eventually approximate the relationship between labor inputs and real GDP for the whole Argentinean economy, we report the correlation and relative volatility of aggregate and real industrial GDP.

Another serious limitation of the data is that there are no reliable estimates of average worker compensation. Also, the relevant series for labor markets have not been updated since 1990. Thus, these series overlap the new GDP estimates only during the 1980:1–90:4 period.

With these caveats about the data in mind, Table 2 suggests that total hours worked,

Figure 4
Argentina, Productivity Is Procyclical



SOURCES: Authors' calculations using new national account estimates from Dirección Nacional de Cuentas Nacionales and index of total hours worked in the manufacturing sector from FIEL.

employment, and hours per worker are strongly procyclical. The statistics for those variables are similar across the different national account estimates. Except for employment, this similarity extends also to the correlations for the United States for both periods.

The correlation of employment in the industrial sector with real industrial GDP is lower in Argentina than in the United States. This finding is not surprising given the much more stringent labor market regulations in Argentina. Because of high firing costs, firms will postpone hiring and firing decisions. So changes in employment will not trace changes in output as closely as they would in the absence of labor market restrictions.

Relative volatilities are remarkably similar across the countries, although volatility tends to be higher in Argentina for the number of hours per worker. This finding, again, likely reflects the labor market restrictions: when confronted with the high costs of firing workers, firms tend to expand or contract the labor hours of those already employed, rather than hire or lay off more workers.

Finally, it is worth noting that productivity in the Argentinean industrial sector is procyclical (*Figure 4*), with correlations and relative volatilities on the same order of magnitude as those for the United States.

Overall, the business-cycle features of Argentinean labor inputs are reasonably similar to those in the United States.

Nominal facts for Argentina

Table 3 summarizes the statistical properties of the business-cycle component of several

Table 3
Cyclical Behavior of Monetary Aggregates and Price Level Indices in Argentina and Other Countries

	Argentina (new national account estimates) 1980:1–95:3	Argentina (old national account estimates) 1970:1–90:4	United States ¹	OECD, G–7, and other European countries ²
M1	Countercyclical	Acyclical	Procyclical	Acyclical/procyclical
Contemporaneous correlation	–.36	–.09	.31	–.06 to .42
Relative volatility ³	15.13	15.68	1.00	.49 to 2.93
Phase shift	Lagging	No clear pattern	Leading	Leading (when countercyclical)
M2	Countercyclical	Acyclical	Procyclical	Acyclical/procyclical
Contemporaneous correlation	–.40	–.07	.46	–.03 ⁴ to .39
Relative volatility ³	12.51	13.08	.88	.59 to 5.56
Phase shift	Lagging	No clear pattern	Leading	No clear pattern
M2–M1	Acyclical	Acyclical	Procyclical	—
Contemporaneous correlation	–.23	.01	.40	—
Relative volatility ³	11.42	13.76	1.12	—
Phase shift	No clear pattern	Leading	No clear pattern	—
Velocity M1	Countercyclical	Countercyclical	Procyclical	—
Contemporaneous correlation	–.46	–.26	.31	—
Relative volatility ³	3.20	4.58	1.18	—
Phase shift	Leading	Leading	Coincidental	—
Velocity M2	Countercyclical	Acyclical	Acyclical	—
Contemporaneous correlation	–.37	–.24	.24	—
Relative volatility ³	5.06	7.08	1.08	—
Phase shift	Lagging	Lagging	Lagging	—
CPI	Countercyclical	Acyclical	Countercyclical	Acyclical/countercyclical
Contemporaneous correlation	–.47	–.20	–.57	–.55 to –.03
Relative volatility ³	16.92	17.54	.82	.18 to 1.82
Phase shift	Lagging	No clear pattern	Leading	Leading
ER	Countercyclical	Countercyclical	—	—
Contemporaneous correlation	–.61	–.49	—	—
Relative volatility ³	16.04	18.29	—	—
Phase shift	Lagging	Lagging	—	—

¹ From Kydland and Prescott (1990).

² From Christodoulakis, Dimelis, and Kollintzas (1995).

³ Ratio of volatility of the variable and the volatility of real GDP reported in Table 1.

⁴ Only Spain exhibits a large negative correlation (–.30).

NOTE: Seemingly anomalous statistics are in bold type.

SOURCES: Authors' calculations, based on sources reported in the text for national accounts and on FIEL for monetary aggregates and price level indices.

nominal and monetary aggregate series. This table presents information analogous to that in Table 4 of Kydland and Prescott (1990), with the necessary modifications to incorporate some idiosyncracies of the Argentinean economy.

First, we do not report statistics for the monetary base. Because of the frequent and cumbersome changes in financial regime that Argentina experienced in the period under analysis, the concept of monetary base does not have the meaning it has in the United States or in the OECD and European countries we use for comparison in this article.²⁶

Second, the implementation of different forms of price controls during the analysis period may have distorted the true business-cycle price features. Therefore, as proxy for the true underlying nominal price level, we also

report statistics for the exchange rate in the black market.

The intense inflationary process that Argentina experienced in the 1970s and 1980s is responsible for the unusual high volatility of all variables in Table 3. However, to correctly interpret this volatility and other statistics in the table, it is important to stress that monetary policy in Argentina during most of the 1970–95 period was not monetary policy in the sense that it is in the United States, but rather a form of implementing fiscal policies financed with money creation.²⁷

One striking similarity with international evidence stands out from the table: whether measured by the consumer price index or the black market exchange rate, the price level has been countercyclical (*Figure 5*), as it is in the

United States and in most European countries (Christodoulakis, Dimelis, and Kollintzas 1995). The countercyclicality of prices for the United States was pointed out in Kydland and Prescott (1990) at a time when economists commonly held the opposite view. Not surprisingly, this finding created considerable debate because it went against the predictions of most Keynesian or monetarist-inspired theories of business cycles.²⁸

For nominal M1, however, the comparison with other countries is not that clear cut. The pattern of correlation for this monetary aggregate depends in an important way on the national account estimates used. For the old estimates, M1 is acyclical and all correlations are similar in sign and magnitude to those reported for the Netherlands in Christodoulakis, Dimelis, and Kollintzas (1995). By contrast, according to the new national account estimates, M1 is countercyclical, whereas in the United States and the European countries in Christodoulakis, Dimelis, and Kollintzas (1995), it is acyclical or procyclical.

The differences between the two national account estimates should serve as a note of caution to researchers working with nominal monetary aggregates for Argentina. It is possible that some of the regularities taken for granted in the past were derived using the old estimates, but now those regularities have disappeared or become less obvious with the new national account estimates.

In any case, both national account estimates suggest that the monetary aggregate of savings accounts and time deposits (M2–M1) is

acyclical. This is in contrast with the United States, where, according to Kydland and Prescott (1990), this monetary aggregate is procyclical and leads the cycle. But it would be wrong to conclude that this evidence suggests that credit arrangements could play a more significant role in U.S. business cycles than in those of Argentina, because during most of the analysis period, there was a considerable degree of financial repression in the latter country. As a result, part of the credit market was channeled through the informal financial sector, whose transactions by its very nature are not captured by the official monetary statistics.

Finally, velocity of all monetary aggregates, whether using the consumer price index (reported in Table 3) or the exchange rate (not reported) as a deflator, is countercyclical, whereas Kydland and Prescott (1990) reported it is procyclical for the United States.

Conclusion

Is the business cycle of Argentina really different from that of other countries? We hope this article shows other researchers how difficult it is to answer this simple question. One reason for this difficulty is that the business-cycle features of Argentina can change substantially from one national account estimate to the next. As we indicate, the commonly held view that absolute volatility of output is abnormally high in Argentina is a myth by the old national account estimates but a fact by the new ones.

Similarly, the correlation of the cyclical component of real total consumption with that of real GDP is within the range observed in other countries, according to the old national account estimates, but unusually high by the new ones. We have given reasons, however, to consider this last feature as partly a figment of the data.

The statistics related to production inputs (labor and investment), which play a crucial role in RBC models, display remarkable similarities with the international evidence. In particular, except for absolute volatilities, all the statistics for investment, labor inputs, and productivity are within the range observed in the United States or European countries.

Based on these statistics, the only challenge for an RBC model of Argentina would be to explain the larger volatility of output. But a study by Mendoza (1995) suggests that an RBC model could accomplish that if properly adapted to deal with the idiosyncracies of the Argentinean economic environment. By that, we do not mean a model that incorporates only

Figure 5
Argentina, Prices Are Countercyclical



SOURCES: Authors' calculations using new national account estimates from Dirección Nacional de Cuentas Nacionales and the consumer price index from Instituto Nacional de Estadísticas y Censos (INDEC) as reported by FIEL.

technology shocks, but one that uses other real factors or economic policies whose effects can be captured through the aggregate production function of the economy. More specifically, Mendoza's study adds terms-of-trade shocks to an RBC model with technology shocks and shows that such a model can replicate about the same proportion of GDP variability—50 percent for G-7 and developing countries—even if the absolute volatility of GDP is substantially larger in the developing countries. Interestingly, according to the Mendoza study, the variability of Argentina's terms of trade is twice that for the United States, which is the order of magnitude by which the variability of Argentina's GDP exceeds that of U.S. GDP (using the new national account estimates).²⁹

A host of other empirical studies confirm the potential of RBC models to mimic a large fraction of the economic fluctuations observed in Latin American countries. For example, using a structural vector autoregression model (VAR), Hoffmaister and Roldós (1997) find that supply shocks are, even in the short run, the main source of the output fluctuations in these countries. Sturzenegger (1989) also reports VAR estimates, according to which supply shocks account for 90 percent of the Argentinean output fluctuations.

The results in Table 3 are unfavorable to the hypothesis that nominal factors play the most important role in economic fluctuations. In particular, the price level is countercyclical. Monetary theories of business cycles have had a hard time accommodating this empirical regularity within an empirically successful (by some measure) dynamic stochastic general equilibrium model. Furthermore, the Argentinean monetary aggregates display, in general, a very different cyclical (countercyclical) pattern than those of the United States and Europe (procyclical). Yet, these differences do not seem to translate to the relative volatilities and other features of real variables, which behave more similarly in Argentina and these other countries.³⁰

In addition, our analysis of the business-cycle debate in Latin America suggests that nominal exchange rate shocks, even during ERBS programs, do not seem to have had the clear real effects the literature has alleged. In fact, the evidence we have presented—circumstantial as it may be—and the few available studies that have attempted to analyze it in a more systematic way all point in the same direction: nominal factors do not seem to be able to account for any significant fraction of the business cycles of Latin American countries in

general, and of Argentina in particular. Perhaps for this reason it is time to give real factors their fair chance to do the job. Therefore, it is essential that a research agenda first specify the empirical regularities that real factors must account for.

To that end, we have presented the facts about the Argentinean business cycle, following a well-defined, systematic approach that does not impose on the data any strong *a priori* belief on a particular theory of business cycles. We hope that our atheoretical description of empirical regularities will motivate further empirical and theoretical work that will ultimately lead to a better understanding of the economic fluctuations and of the real effects of inflation stabilization programs in Latin American countries in general, and in Argentina in particular.

Notes

The authors are grateful to David Gould, Carlos Végh, and Mark Wynne for substantive and useful comments. We are also thankful to Anne Coursey, whose editorial suggestions contributed to a clearer exposition of our ideas.

¹ This distaste for economic fluctuations is implied by the assumption that economic agents have concave preferences. An old joke illustrates the meaning of this economic jargon. An economist is informed that a fellow citizen, with one leg freezing in ice and the other boiling in hot water, is in pain. "Why?" the economist asks. "On average, he is OK." Actually, this joke doesn't do justice to the economics profession, whose members know very well that the citizen has concave preferences: he would prefer to have both feet in lukewarm water. Likewise, economists know that consumers would prefer an economy in which output and consumption grow at the same steady rate, quarter after quarter, to one whose growth is the same on average but varies from high (a hot economy) in some quarters to slow (a cold economy) in others.

² So much so that a prominent monetarist like Lucas himself recently asserted, "Monetary shocks just aren't that important. That's the view I've been driven to.... There's no question, that's a retreat in my views." (*The New Yorker*, December 1996, 55.)

³ For an excellent summary, see Végh (1992).

⁴ For details, see Kiguel and Liviatan (1992), Végh (1992), Calvo and Végh (1993), and citations therein.

⁵ The vertical line is drawn on the tick corresponding to the period in which the program was announced, unless the announcement was made in the first third of the period. In this case, the vertical line is drawn on the tick corresponding to the immediately preceding period. The implicit assumption is that the real effects of ERBS programs did not have time to show up in the

period of the announcement if it came too late in the period.

- ⁶ This prediction arises from the intertemporal substitution effect originally emphasized by Calvo (1986): the temporary (by assumption) reduction of the devaluation rate translates into a temporary reduction in the nominal interest rate that increases the demand of current tradable goods relative to future tradable goods. The empirical relevance of this mechanism, however, has been questioned by Reinhart and Végh (1995a).
- ⁷ “Witty” analysis of plots is a valid and widely used method of analyzing economic evidence, especially in the early stages of a theoretical development. However, this casual empiricism presents serious problems (see Easterly 1996). To avoid ambiguities and imprecisions, plot analysis should be complemented with more formal quantitative methods whenever possible. In our case, it would be important to construct measures establishing whether the consumption growth rate immediately after the announcement of ERBS programs was significantly different (by some criteria) than immediately before. The ERBS literature has yet to provide such a measure. The few formal quantitative studies in that literature that have attempted to go beyond the plot analysis (Reinhart and Végh 1994, 1995b, and Hoffmaister and Végh 1996) are concerned, instead, with the dynamics of real variables *within* different inflation stabilization programs.
- ⁸ It is true that nominal factors deliver important real effects in the nominal wage rigidity version of the monetarist-inspired models examined by Rebelo and Végh (1995). However, that success is achieved at the expense of generating countercyclical real wages, which goes against the available evidence. For example, Carrera, Féliz, and Panigo (1996) report that real wages in Argentina and Brazil are procyclical.
- ⁹ In fact, none of the stabilization programs reported in the literature has been a “pure” monetary experiment. They were always associated with other policy measures, such as financial liberalization, changes in taxes and tariffs, and so on, all factors that would fall in the category of “real” in the analytical framework of real-business-cycle theory. The omission of these factors from the analysis may lead to serious misinterpretations of the evidence on stabilization programs. For example, as pointed out by Calvo (1986), “...if expected to be temporary, a banking liberalization policy will tend to have effects similar to the type of exchange rate policies analyzed above [in reference to ERBS programs].”
- ¹⁰ In this sense, we enthusiastically agree with Calvo and Végh (forthcoming, 14) that “too little empirical work—relative to theoretical work—has been done in the area.”
- ¹¹ This methodology is “theory free” in the sense that it does not take any stand with respect to the causes of economic fluctuations.
- ¹² Heston (1994) provides a very thorough discussion of all the measurement problems typical of the national accounts of developing countries like Argentina.
- ¹³ The change in the base year is not the only difference between the two series. There were also important methodological modifications and other adjustments in the new estimates. The magnitude of the corrections should be apparent from the fact that the level of annual real GDP for 1980 is 36 percent higher in the new estimates than in the old estimates. Jumps of this size in the level of GDP between subsequent national account estimates are not unusual in European countries as well (see Maddison 1995, 124).
- ¹⁴ A technical presentation of the HP filter can be found in Hodrick and Prescott (1997).
- ¹⁵ Because we are dealing with quarterly data, we follow Kydland and Prescott (1990) in setting the “smoothing parameter” $\lambda = 1600$.
- ¹⁶ We acknowledge that the statistical properties of the detrended components measured with the HP filter remain somewhat controversial (see, for example, King and Rebelo 1993). But it is important to keep in mind that our main goal is to compare the business-cycle regularities of Argentina with those of the United States and Europe. Several recent studies for such countries have indeed detrended the data with the HP filter as well. Moreover, no detrending technique is free from criticism.
- ¹⁷ The reason for this transformation of the data is that the business-cycle literature is concerned with percentage (rather than absolute) deviations from trend in growing series.
- ¹⁸ As an exercise, we extended the GDP series from each national account estimate to the entire 1970:1–95:4 period by applying to each estimate the growth rates of the other during the nonoverlapping period. The cyclical volatility of GDP from the series constructed this way is 3.9 for the new estimates and 3.65 for the old ones.
- ¹⁹ See table A2 in Christodoulakis, Dimelis, and Kollintzas (1995).
- ²⁰ According to the permanent income hypothesis, the series for consumption should be smoother than that for income (or GDP). However, this prediction is valid only for consumption of nondurable goods, and the series for consumption typically includes durable goods.
- ²¹ The conjecture that the excess volatility of consumption relative to that of output most likely reflects a mis-measurement problem, as hypothesized in note 20, is reinforced by the finding in Backus, Kehoe, and Kydland (1995) that consumption volatility is indeed lower than that of GDP in the U.K. once expenditures on consumption durables are excluded from aggregate consumption.
- ²² See, for example, “Overcoming Volatility,” Inter-American Development Bank (1995, 191).

- ²³ Intuitively, in an economy incapable of transferring wealth between periods, economic agents will use up all they produce in every period—that is, consumption will be exactly equal to income period after period. Although there is absolutely no credit in this economy, the volatility of consumption cannot exceed that of output (or income).
- ²⁴ Heston (1994, 43) discusses a concrete case in which allocating imports between consumption and investment, with procedures analogous to the one outlined above, may lead to significant errors in consumption. The new national account estimates used information from the National Economic Census of 1985 to impute imports as consumption or investment goods, and data from the National Economic Census of 1973 for the same imputation of domestically produced goods. For more details, see CEPAL/ECLA, final report, 1991. The particular example in the text about the allocation of automobiles between consumption and investment was provided in an interview with staff members from the Subsecretaría de Programación Económica del Ministerio de Economía of Argentina.
- ²⁵ This may have serious implications for the prolific literature inspired by reported consumption booms in Latin American countries: it may well be the case that these booms, or at least a part of them, are in reality capturing mismeasured investment booms.
- ²⁶ For example, in July 1982 all Argentinean deposits were “nationalized”—that is, from that month on, all deposits in financial institutions were considered deposits at the central bank. Since these deposits are by definition part of the money base, this base became almost identical to M2 and therefore experienced an increase equal to the difference between these two monetary aggregates previous to the reform. Almost all of the resulting jump in the money base that month was, then, an artifact of accounting procedures rather than the result of a change in monetary policy. For these and other details on the institutional features of the Argentinean financial system over the 1900–95 period, see Zarazaga (1996).
- ²⁷ Monetary policy in the United States is closer to what economists would regard as “pure” monetary policy. In particular, U.S. monetary policy is carried out through open-market operations that exchange one form of government debt (fiat money) for another (government bonds), leaving the overall level of outstanding government debt unchanged. In Argentina, by contrast, the typical monetary policy consisted of handing over fiat money directly to the treasury, which used it to finance its deficit and not to retire other forms of government debt as in the United States. Thus, monetary policy in Argentina has typically increased the overall government debt by expanding the money base. It is in this sense that Argentina’s monetary policy has really been a hidden form of fiscal policy.
- ²⁸ Abel and Bernanke (1992) provide an excellent, balanced discussion of the business-cycle facts and their consistency with RBC or Keynesian theories (see especially Sections 11.2, 12.4, and 12.5).
- ²⁹ A recent paper by Crucini and Kahn (1996) shows that tariffs can have a larger impact on GDP than generally believed. This is relevant in the light that substantial implicit or explicit changes in tariffs were a usual ingredient of the many stabilization programs implemented in Argentina during the sample period.
- ³⁰ Gavin and Kydland (1996) have recently reported a related finding for the United States. They found that real variables in that country seemed to have been invariant to the changes in the cyclical behavior observed in the nominal variables after 1979. They showed that these observations can be generated by a business-cycle model with impulses to technology in which monetary policy affects the cyclical behavior of nominal variables but not that of real variables.

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