10

European Monetary Unification

Precocious or Premature?

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Prior to the formation of the euro area, in a process formally known as European Economic and Monetary Unification (EMU), research suggested that potential participants in EMU were less economically integrated than regions of the United States. Subsequent research held out the hope that countries within the euro area were becoming more integrated because of the formation of the "single market" in 1992 and the creation of the common currency in 1999. This chapter finds only weak evidence of an increase in euro area integration since 1999. Countries in the euro area remain considerably less integrated than regions or states within the United States, particularly in the area of labor markets.

Previous Studies

In a widely cited paper, Tamim Bayoumi and Barry Eichengreen (1992) found that the precursor to the European Union, the European Community, was less economically integrated—and thus less well suited as a common currency area—than the United States. However, they also noted that a core group of countries centered on Germany was roughly as integrated as the United States.[1] Bayoumi and Eichengreen based their conclusions on measures of the correlation of inflation and economic activity across members of the

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1. The core group was Belgium, Denmark, France, Germany, Luxembourg, and the Netherlands.

European Community and across regions of the United States over the period 1960–88. Their guiding principle was that regions that share common economic movements are better suited to share a common monetary policy than regions with highly different economic movements.

Jeffrey Frankel and Andrew Rose (1998) argued that currency union may increase the synchronization of business cycles across member economies, in part because of increased trade links. Andrew Rose and Eric van Wincoop (2001) predicted that trade of euro area countries would rise "in excess of 50 percent." Richard Baldwin (2006) subsequently estimated that currency union had increased trade among euro area countries by 5 to 15 percent. Joseph Gagnon and Marc Hinterschweiger (2011) found results consistent with Baldwin's estimate.

Phillip Lane (2006) surveyed research on several dimensions of integration within the euro area, including price differentials, labor mobility, financial integration, fiscal coordination, and trade. Lane found strong evidence of integration in financial markets and trade; he found little evidence of increased integration of labor markets, and only weak evidence of integration in fiscal policy and inflation.

Rose (2008) found that EMU had increased trade of member countries between 8 and 23 percent. Using meta-analysis of 20 studies of the effect of trade on business cycle correlation, he estimated that the increased trade caused by EMU may have increased the correlation of detrended real output across euro area members from about 0.2 to at least 0.4.

Jean-Claude Trichet argued that measures of dispersion of inflation, GDP growth, and labor costs across members of the euro area are comparable to those across states of the United States.[2]

A Fresh Look

This chapter presents updated analysis similar in spirit to, though somewhat simpler than, that of Bayoumi and Eichengreen (1992). Bayoumi and Eichengreen decomposed shocks into supply and demand shocks. They focused more on supply shocks than on demand shocks because differences in monetary policy across European countries prior to EMU contributed to dispersion in demand shocks that presumably would not be present after EMU. This chapter does not decompose shocks in this way because it focuses on the period after EMU in which the euro area had a common monetary policy.

In addition to looking at GDP growth and inflation, this chapter examines the unemployment rate. The importance of labor market integration for a currency union was first advanced by Robert Mundell (1961) in his Nobel prize–winning research on optimum currency areas. The experience of Texas within the United States over the past few years confirms Mundell's insight.

2. Jean-Claude Trichet, The Euro, Its Central Bank, and Economic Governance, Stamp Memorial Lecture, London School of Economics and Political Science, June 13, 2011.

Table 10.1 Data description

Data	United States	Euro area
Real GDP, GDP deflator, and unemployment rate (annual, 1980–2010); data on US regional GDP and GDP deflator begin in 1987	9 Census divisions (main): New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific 51 states (alternate): 50 states plus District of Columbia (statistics weighted by nominal GDP)	10 countries (main): Original members except Luxembourg 13 countries (alternate): Original members plus Denmark and Greece (statistics weighted by nominal GDP) Core (alternate): Austria, Belgium, Denmark, France, Germany, Luxembourg, and the Netherlands

Sources: IMF, *World Economic Outlook* database; US Bureau of Economic Analysis; and US Bureau of Labor Statistics.

The rise of world oil prices since 2003 has greatly boosted the growth rate of Texas GDP, yet the Texas unemployment rate remains close to the US average as a large inflow of workers has arrived from other states. This labor market flexibility has reduced the cost to Texas and the rest of the United States of having a common monetary policy. Because unemployment is more closely linked to the unobservable output gap than real GDP, divergences in the unemployment rate across regions may be a better indicator of the cost of a common monetary policy than divergences in GDP growth.

Data Description

Table 10.1 describes the data and the definition of regions. The variables are the rates of real GDP growth, inflation, and unemployment. Inflation is measured using the GDP deflator.[3] Because the regional breakdowns for the euro area have different geographic coverage, the areawide data for the euro area are calculated as nominal GDP–weighted averages of data for the regions that are included in each breakdown. Table 10.2 displays summary statistics for both the 12 years since the launch of EMU, 1999–2010, and for periods prior to EMU, which differ according to availability of data.

The main regional breakdown for the United States consists of the nine Census divisions. An alternate breakdown consists of the 50 states plus the District of Columbia. Statistics for this alternate breakdown are weighted

3. Consumer price inflation is not available on a state or regional basis in the United States. It is available for selected metropolitan areas. Bayoumi and Eichengreen (1992) used the GDP deflator.

Table 10.2 Summary statistics

Statistic	United States		Euro area	
Real GDP growth rate	**1988–98**	**1999–2010**	**1981–98**	**1999–2010**
Area average	3.2	2.0	2.1	1.5
Area standard deviation	1.7	1.9	1.2	2.0
Standard deviation of regional averages	0.9	0.6	0.7	0.8
Average of regional standard deviations	1.9	2.0	2.0	2.6
Inflation rate				
Area average	2.5	2.2	4.8	1.8
Area standard deviation	0.9	0.8	2.6	0.5
Standard deviation of regional averages	0.2	0.2	2.7	0.6
Average of regional standard deviations	1.0	0.9	3.5	1.4
Unemployment rate	**1980–98**	**1999–2010**	**1980–98**	**1999–2010**
Area average	6.6	5.8	9.2	8.5
Area standard deviation	1.4	1.9	1.3	0.7
Standard deviation of regional averages	0.9	0.6	4.1	2.4
Average of regional standard deviations	1.6	1.8	2.3	1.8

Note: Regional statistics are based on the main regional breakdowns defined in table 10.1.

by nominal GDP in order to damp the effect of idiosyncratic shocks in small regions.

The main regional breakdown for the euro area consists of the 11 original members minus Luxembourg. Luxembourg is excluded because it has a population barely one-tenth that of the next smallest member (Ireland). Very small regions are prone to idiosyncratic shocks that bias downward their correlation with the rest of the currency union. One alternate breakdown consists of the 11 original members plus Denmark, which has maintained a tightly pegged exchange rate to the euro since its inception, and Greece, which joined the euro area in 2001. As in the case of the alternate breakdown in the United States, statistics for this alternate breakdown are weighted by nominal GDP. Another alternate breakdown, referred to as the core group, consists of the core countries identified by Bayoumi and Eichengreen (1992) plus Austria.

Real GDP Growth

According to Table 10.2, real GDP growth was moderately higher in the United States than in the euro area during 1999–2010 but variability of this growth was roughly equal in the two areas. Differences in growth rates across regions (the third line) were slightly larger in the euro area than in the United States, but the opposite was true in the years before 1999. The variability of

Table 10.3 Regression analysis of GDP growth rates

	United States			Euro area			
	9 Census divisions		51 states (weighted)	10 countries		13 countries (weighted)	Core
	1999–2010	1999–2007	1999–2010	1999–2010	1999–2007	1999–2010	1999–2010
β_1	0.02	0.10	0.08**	0.01	0.11	0.01	–0.07
	(.06)	(.09)	(.03)	(.07)	(.08)	(.05)	(.06)
β_2	–0.05	–0.07	–0.04	0.19*	0.07	0.12	0.03
	(.07)	(.08)	(.04)	(.10)	(.07)	(.08)	(.09)
β_3	0.96***	0.89***	0.98***	1.13***	1.10***	1.02***	1.20***
	(.05)	(.10)	(.04)	(.07)	(.10)	(.05)	(.07)
Regression Standard deviation	0.95	0.95	1.68	1.32	0.78	1.01	0.95
	1990–98			1983–98			
β_1	0.15**		0.11***	0.44***		0.29***	0.20**
	(.06)		(.04)	(.07)		(.05)	(.08)
β_2	–0.04		–0.02	–0.05		–0.09*	0.10
	(.06)		(.04)	(.07)		(.05)	(.08)
β_3	0.93***		0.94***	0.80***		0.86***	0.83***
	(.07)		(.05)	(.10)		(.07)	(.13)
Regression Standard deviation	0.92		1.60	1.44		1.04	1.44

$\Delta y_{it} = \alpha_i + \beta_1 \Delta y_{it-1} + \beta_2 \Delta y_{it-2} + \beta_3 \Delta y_{(EA|US)t}$
(α_i are regional fixed effects)

Notes: *, **, *** denote statistical significance at 10, 5, and 1 percent levels, respectively. Standard errors are in parentheses. Weighted statistics are weighted by regional nominal GDP. See table 10.1 for data description and sources.

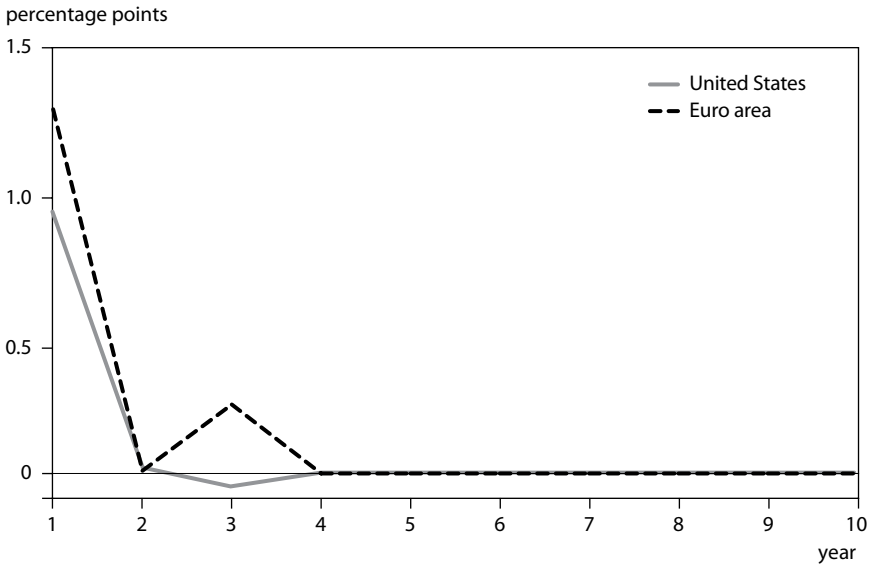
real GDP growth over time in each region (the fourth line) was somewhat greater on average in the euro area than in the United States after 1999.

Table 10.3 presents results of panel regressions of real GDP growth in the United States and the euro area. The top half of the table focuses on the post-EMU period and the bottom half focuses on the pre-EMU period. Real GDP growth in each region is regressed on two lags of itself plus the current value of GDP growth for the area as a whole.[4] In addition, there is a complete set of regional fixed effects that allows each region to have a different average growth rate. Δy denotes the growth rate of GDP. α and β are coefficients to be estimated. The subscript *i* in the regression equation denotes regions and the subscript *t* denotes years. The subscripts *EA* and *US* denote areawide data for the euro area or the United States, respectively.

$$\Delta y_{it} = \alpha_i + \beta_1 \Delta y_{it-1} + \beta_2 \Delta y_{it-2} + \beta_3 \Delta y_{(EA|US)t}$$

4. Additional lags are never significant in tables 10.3, 10.4, and 10.5.

Figure 10.1 Magnitude and persistence of region-specific real GDP shocks



Source: Author's calculation based on regression standard deviation and regression coefficients for the main regional breakdowns in 1999–2010 from table 10.3.

The coefficient β_3 indicates the extent to which the regions share common shocks; a value of β_3 near zero means regions do not share common shocks, whereas a value of β_3 near one means regions fully share common shocks. The coefficients β_1 and β_2 indicate the extent to which idiosyncratic, or region-specific, shocks are persistent or transitory. Large values indicate that regional differences persist for a long time, whereas small values indicate that regional differences die out quickly. Finally, the standard deviation of the regression is a measure of the size of the typical region-specific shock (in percentage points).

According to the top half of table 10.3, shocks to real GDP growth rates in the post-EMU period are highly shared across regions, as shown by the estimates of β_3 close to one. Region-specific shocks are not persistent, as shown by the estimates of β_1 and β_2 close to zero, although there is a slight indication of greater persistence in the euro area 10-country and 13-country breakdowns. These results are not sensitive to excluding the Great Recession years (2008–10) from the analysis, as shown in the second column for each area. Figure 10.1 displays the magnitude and persistence of region-specific GDP shocks for the main regional breakdowns in the post-EMU period based on these regression results. Region-specific GDP shocks are moderately larger in the euro area and have slightly greater persistence.

In the pre-EMU period, regional coherence (β_3) was roughly the same in the United States, but noticeably lower in the euro area. Persistence of regional

GDP shocks (β_1) was slightly larger in the United States and considerably larger in the euro area prior to EMU. These results may reflect the adoption of a common monetary policy in the euro area, which replaced region-specific monetary policies with a common monetary policy.

Overall, the GDP regressions display similar degrees of economic integration in the United States and the euro area since 1999.

Inflation

As can be seen in the middle section of table 10.2, inflation was a little higher in the United States than in the euro area over the past 12 years. In addition, the volatility (standard deviation) of US inflation was somewhat higher than that of euro area inflation. However, the dispersion of average inflation rates across regions was much higher in the euro area than in the United States.[5] The volatility of regional inflation is also higher in the euro area than in the United States, despite the lower volatility for the euro area as a whole.

Table 10.4 presents regressions of regional inflation similar in structure to those shown for GDP growth in table 10.3. For the United States, the results are similar for both regional breakdowns and for the shorter sample period. The estimates of β_3 imply that inflation in each region moves roughly one-for-one with national inflation. The estimates of the lag coefficients (β_1 and β_2) imply that idiosyncratic regional shocks to inflation are very short-lived.

The estimates are different for the euro area. For the main breakdown (10 countries), regional inflation moves a bit more than half of areawide inflation (β_3) and idiosyncratic regional shocks are strongly persistent—two-thirds of any increase in regional inflation carries over into the next year (β_1). In the sample that ends in 2007, the persistence of region-specific inflation is a bit lower and the coherence of regional inflation rises a bit; but the coherence is still notably lower, and persistence considerably higher, than in the United States. For the 13-country breakdown, the coherence of regional inflation (β_3) also is somewhat higher, probably reflecting the high weights on French and German inflation, which dominate the euro area average. For the core group, persistence (β_1 and β_2) drops essentially to zero, similar to that in the United States, but coherence remains notably lower than in the United States.

Figure 10.2 displays the magnitude and persistence of region-specific inflation shocks based on the regressions for the main regional breakdowns in 1999–2010. Region-specific inflation shocks (even after allowing for different regional mean rates of inflation) are much larger and more persistent in the euro area than in the United States.

The bottom half of table 10.4 shows results for the pre-EMU period. For the United States, the results are essentially the same as for the post-EMU

5. Surprisingly, this dispersion is even greater for the core of the euro area, at 0.8 (not shown in the table).

Table 10.4 Regression analysis of inflation rates

	United States			Euro area			
	9 Census divisions		51 states (weighted)	10 countries		13 countries (weighted)	Core
	1999–2010	1999–2007	1999–2010	1999–2010	1999–2007	1999–2010	1999–2010
β_1	–0.07	0.08	–0.14***	0.65***	0.45***	0.39***	–0.07
	(.08)	(.08)	(.04)	(.09)	(.10)	(.08)	(.10)
β_2	0.09	0.01	0.03	–0.04	–0.07	0.00	–0.10
	(.07)	(.06)	(.04)	(.10)	(.10)	(.09)	(.10)
β_3	0.94***	0.90***	1.07***	0.60***	0.73**	0.81***	0.71***
	(.08)	(.09)	(.06)	(.13)	(.18)	(.12)	(.18)
Regression Standard deviation	0.59	0.37	1.12	0.90	0.77	0.75	1.09
	1990–98			1983–98			
β_1	–0.02		–0.07	0.53***		0.37***	0.36***
	(.10)		(.05)	(.08)		(.06)	(.09)
β_2	–0.03		–0.29***	0.05		0.06	–0.00
	(.12)		(.06)	(.08)		(.06)	(.09)
β_3	1.04***		1.28***	0.30***		0.60***	0.38***
	(.13)		(.08)	(.10)		(.08)	(.12)
Regression Standard deviation	0.45		0.85	1.86		1.76	1.67

$\Delta p_{it} = \alpha i + \beta_1 \Delta p_{it-1} + \beta_2 \Delta p_{it-2} + \beta_3 \Delta p_{(EA|US)t}$
(α_i are regional fixed effects)

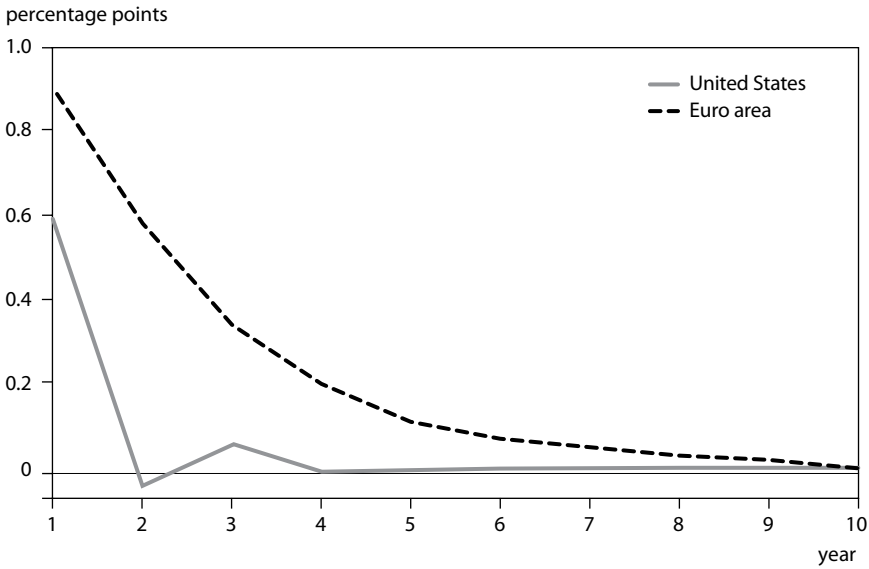
Notes: **, *** denote statistical significance at 5 and 1 percent levels, respectively. Standard errors are in parentheses. Weighted statistics are weighted by regional nominal GDP. See table 10.1 for data description and sources.

period.[6] For the 10-country and 13-country euro area breakdowns, the regressions find similar persistence and lower coherence before EMU than after. For the core of the euro area, the differences before and after EMU are somewhat greater.

Note that all of these regressions include regional fixed effects, which allow each region to have a different average inflation rate. One objective of a monetary union may be to have the same average inflation rate across the regions. The summary statistics show that regional inflation rates are very similar in the United States but much less so in the euro area. Regressions without regional fixed effects (not shown) display similar results to those of table 10.4 for the United States, but less coherence and greater persistence for the euro area. Different mean rates of inflation might arise if euro area regions

6. The negative second lag in the 51-state regression is probably spurious. Owing to lack of data, the sample for the United States is rather short.

Figure 10.2 Magnitude and persistence of region-specific inflation shocks



Source: Author's calculation based on regression standard deviation and regression coefficients for the main regional breakdowns in 1999–2010 from table 10.4.

had different price levels prior to EMU and were converging toward a common level of prices. Before the Great Recession, it was commonly argued that higher inflation in the periphery of the euro area reflected such a convergence process. Now, however, many argue that different inflation rates across euro area regions during the past decade led to a divergence of prices from long-run equilibrium.

Overall, the inflation data and regressions for the post-EMU period display greater economic integration in the United States than in the euro area, although the differences are notably smaller between the United States and the core of the euro area. The euro area has narrowed some of the large integration gap that existed before EMU, especially in the core.

Unemployment

The bottom section of table 10.2 compares statistics on unemployment. The average unemployment rate for the United States is considerably lower than that for the euro area, but unemployment was a lot more volatile in the United States during the past 12 years. It is widely accepted that US firms are both more willing and more able to fire workers in downturns and thus feel greater freedom to hire in upturns. Differences in average rates of unemployment across regions are much larger in the euro area than in the United States. This finding is true even within the core of the euro area (not shown). The volatility

Table 10.5 Regression analysis of unemployment rates

	United States			Euro area			
	9 Census divisions		51 states (weighted)	10 countries		13 countries (weighted)	Core
	1999–2010	1999–2007	1999–2010	1999–2010	1999–2007	1999–2010	1999–2010
β_1	0.22***	0.46***	0.37***	1.29***	1.15***	1.25***	1.01***
	(.08)	(.11)	(.04)	(.08)	(.10)	(.07)	(.11)
β_2	–0.04	–0.20**	–0.09*	–0.62***	–0.42***	–0.62***	–0.47***
	(.10)	(.09)	(.05)	(.07)	(.08)	(.07)	(.10)
β_3	0.83***	0.67***	0.77***	0.19**	0.05	0.19*	0.25**
	(.05)	(.09)	(.03)	(.09)	(.09)	(.11)	(.13)
Regression Standard deviation	0.45	0.27	0.63	0.93	0.59	0.85	0.55
	1982–98			1982–98			
β_1	0.69***		0.77***	1.38***		1.21***	1.28***
	(.08)		(.03)	(.07)		(.06)	(.07)
β_2	–0.21***		–0.24***	–0.60***		–0.54***	–0.61***
	(.06)		(.03)	(.06)		(.05)	(.06)
β_3	0.54***		0.50***	0.07		0.27***	0.15**
	(.05)		(.02)	(.07)		(.06)	(.08)
Regression Standard deviation	0.66		0.74	0.91		0.62	0.50

$u_{it} = \alpha_i + \beta_1 u_{it-1} + \beta_2 u_{it-2} + \beta_3 u_{(EA|US)t}$
(α_i are regional fixed effects)

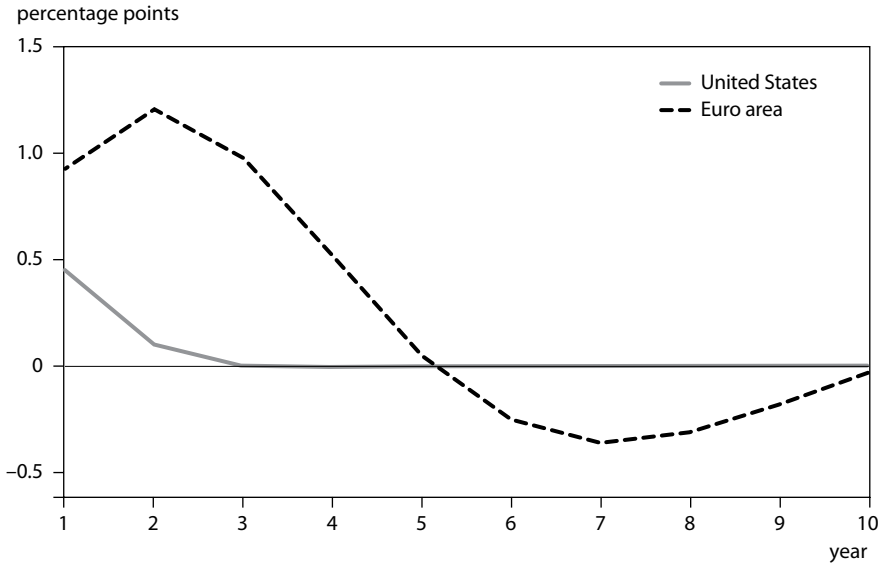
Notes: *, **, *** denote statistical significance at 10, 5, and 1 percent levels, respectively. Standard errors are in parentheses. Weighted statistics are weighted by regional nominal GDP. See table 10.1 for data description and sources.

of unemployment by region (after subtracting region-specific means) is broadly similar in the United States and the euro area.

Table 10.5 presents results of regressions of the regional unemployment rates on their own lagged values and on the value of the areawide unemployment rate. As in the regressions of GDP growth and inflation, fixed effects are included for each region to control for differences in the average unemployment rates across regions. In the United States, about 80 percent of national movements in unemployment are shared across the regions (β_3). Idiosyncratic regional shocks to unemployment die out quickly (β_1 and β_2). These results are not particularly sensitive to ending the sample in 2007.

The results for the euro area are strikingly different. Only about 20 percent of areawide movements in unemployment are shared across the regions; even in the core, this coherence is only 0.25. These differences are not greatly changed by restricting the sample to the period before the Great Recession. The estimates of β_1 around 1.3 imply that idiosyncratic regional shocks are

Figure 10.3 Magnitude and persistence of region-specific unemployment shocks



Source: Author's calculation based on regression standard deviation and regression coefficients for the main regional breakdowns in 1999–2010 from table 10.5.

not only persistent but actually tend to grow in the near term before slowly dying out. In the core, idiosyncratic shocks do not grow over time, but they are still more persistent than in US regions. Figure 10.3 shows that region-specific unemployment shocks in the euro area are both larger and more persistent than in the United States.

The bottom half of table 10.5 presents results for unemployment prior to EMU. For both the United States and the euro area, the sample is 1982–98. For the United States, the coherence of unemployment shocks across regions appears to have been somewhat lower in the earlier sample and the persistence of regional shocks moderately greater. For the euro area, there is little difference in the coherence of unemployment shocks before and after EMU. In both samples, coherence is far lower in the euro area than in the United States. Persistence appears to have decreased a bit over time in the core of the euro area, but remained well above that in the United States over the past 12 years. For the overall euro area, there is little change in the persistence of region-specific unemployment shocks, with persistence remaining far above that in US regions.

Overall, the unemployment data and regressions for the post-EMU period display much greater economic integration in the United States than in the euro area, and the differences are nearly as large when comparing the United States to the core of the euro area. The euro area has made little progress in integrating its labor markets since the launch of EMU.

Conclusion

These results suggest that countries in the euro area are less economically integrated than states or regions in the United States, but the degree of integration varies across markets. Specific findings include the following:

- Progress toward integration in the euro area is greatest in terms of real GDP growth. Countries in the euro area now have GDP growth rates that are nearly as closely connected as those of US regions.
- Inflation rates are less closely linked in the euro area than in the United States, although the core of the euro area has correlations not far from US levels.
- There has been little progress in linking unemployment rates within the euro area. Labor markets in euro area countries are far less integrated than in US regions, and these divergences are nearly as great for the core of the euro area as for the entire euro area.

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