BEA Statistics and New Indicators of Economic Condition

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ECONOMIC statistics play a critical role in answering important questions posed by the recent economic recession. What caused it? Can such slowdowns be avoided in the future? Policymakers, businesses, and households would benefit greatly from indicators that provide early warnings of brewing economic volatility.

Developing indicators that gauge the condition of the economy has long been a central goal of the Bureau of Economic Analysis (BEA). Historically, new economic measures have arisen from economic dislocations. In fact, the interest in macroeconomic measurement generated by the Great Depression led to the development of BEA's modern national income and product accounts (NIPAs).

The recession of 2007–2009 prompted BEA to examine possible new measures to aid in economic policymaking.[1] Continuing in that direction, this article explores additional methods by which BEA data can be used to generate indicators of emerging imbalances in saving, investment, assets, liabilities, and other key variables that shed light on business cycles.

Given the central role of financial disruptions in the economic slowdown, economists have focused on the links between the financial and real sectors. Empirically, historical financial crises can have big impacts on the real economy (Mitchell 1923; Kindelberger 1978; Reinhart and Rogoff 2008, 2009a, 2009b; and Jorda, Schularick, and Taylor 2012). Despite a great deal of effort to link the two, economists have not achieved a clear consensus on what indicators one should follow (Hall 2010), heightening interest in developing new indicators.[2] To avoid duplication with other efforts, we emphasize statistical areas in which BEA has extensive experience: the integrated macroeconomic accounts (IMAs), the NIPAs, the international transactions accounts (ITAs), the regional accounts, and the industry accounts.

The IMAs link BEA's NIPAs with the Federal Reserve Board's financial accounts. The IMAs place real activity and associated financial activity on the same basis, allowing for easy comparisons. For example, we can quickly examine the relationship between residential investment and the growth of mortgage debt.

The ITAs link international real activity and financial activity. BEA has expanded these accounts significantly over time. They include information related to financial derivatives and the currency denomination of cross-border assets, among other items. BEA has also expanded its regional and industry accounts recently, allowing for a more insightful examination of economic conditions that perhaps were not previously visible.

A number of observers have expressed concern that well-known gaps in data make developing useful new indicators inherently difficult.[3] However, in some cases, we believe that filling the data gaps does not require entirely new data products. Instead, existing data from different sources can be integrated to create telling statistics.

This article proceeds as follows:
- We examine an area that figured prominently in discussions of the recession, the housing market, and discuss some measures constructed with data from the IMAs.
- We discuss an aggregate economic approach to anticipating economic slowdowns, one that relies on BEA's familiar NIPA aggregates.
- We look at contagion effects and use BEA data to explore whether certain measures of cross-border

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1. See Landefeld and others (2010).

2. For example, the U.S. Office of Financial Research has made identifying and developing such indicators a priority (U.S. Office of Financial Research 2012).

3. A recent report by the International Monetary Fund (IMF) and Financial Stability Board (FSB) argued that there are a number of gaps in integrated real and financial data (IMF and FSB 2011). The report recommends expanding coverage of financial linkages, especially across borders. The report also suggested expanding sectoral detail, especially in financial flows data, because aggregate data may hide major weaknesses in certain subsectors.

activity and measures of regional and industry activity can indicate weakness in the economy.

As the economy is complex and evolving, no single indicator is likely to be able to predict large dislocations. In addition, implementation of new statistical programs aimed at early warning signals will require statistical agencies to grapple with thorny issues.

However, well-constructed sets of indicators may be able to provide early warnings of where risks are emerging, how much cushion the economy has against potential shocks, and how much exposure various sectors have to shocks in other sectors.

Anticipating Shocks: The Housing Market

The collapse of the housing market was an important feature of the 2007–2009 recession. Many observers have suggested that leverage played a critical role, as too many people took on too much debt. The data show, however, that the resulting defaults did not result from excess leverage alone. While households did increase their debt holdings, the debt was secured by increasingly expensive real estate. Leverage only began to increase after negative shocks in the housing market pushed households under water.

To illuminate these issues, we use various time series available from the IMAs, which are available on the BEA Web site.

The household balance sheet was not greatly affected by the prerecession runup in housing prices. Households were not taking on historically high rates of leverage as measured by the loan-to-value ratio. Chart 1 shows the ratio of mortgage debt to real estate assets for the household sector. It was not until housing prices' appreciation began to slow in 2007 that this ratio shows a significant change from prior experience. It even declined slightly from 2003 to 2005, the height of the housing bubble. The balance sheet did not look unusually weak until housing asset prices declined. Chart 2 shows a measure of housing price changes, the ratio of the change in household real estate values to real estate assets. This ratio was growing consistently during the early 2000s but then turned strongly negative.

How vulnerable was the household sector to shocks to housing prices? Some data show signs of increasing financial fragility due to the housing boom. Mortgage debt grew in concert with housing prices. Chart 3 shows the ratio of new mortgage debt to household saving. This ratio indicates that the household sector was taking on significant debt, compared with the household sector's ability to withstand shocks to that debt, such as increasing interest rates. Saving is used because it measures the ability of the household to pay

additional charges without reducing consumption. In 2005 and 2006, there was a large increase in mortgage debt.

Chart 4 shows the ratio of household saving to total outstanding mortgage debt. This ratio indicates that the runup in new mortgage debt led to a reduced ability of saving to withstand negative shocks. Household saving fell from at least 7 percent of the stock of debt at the end of the 1990s to only 2 percent by 2005. As long as housing prices were high, homeowners suffering a negative shock, such as job loss, could sell their houses and get out of the mortgage. When the market for houses weakened, however, that no longer held true,

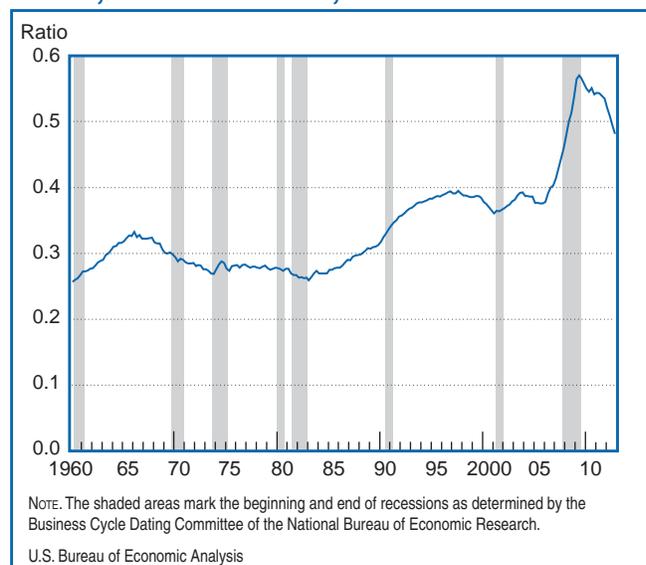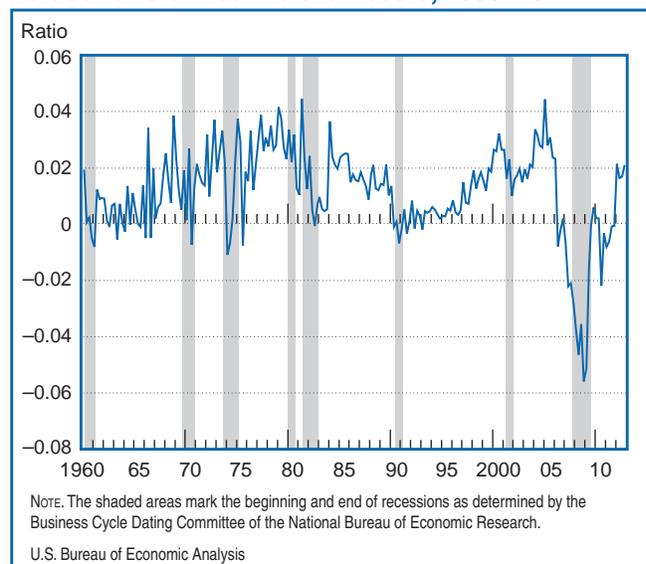### Chart 1. Ratio of Mortgage Debt to Real Estate Assets, Household Sector, 1960–2012

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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Chart 2. Ratio of Change in Household Real Estate Values to Total Real Estate Assets, 1960–2012

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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and homeowners had relatively little in saving to cover losses should they need to sell. With relatively less in saving as a cushion, households were more vulnerable to housing price declines.

Chart 5 shows that mortgage debt as a share of compensation began to increase in the 2000s. This ratio has declined since the collapse of the housing market but remains well above its 1990s level.

The collapse in the housing market appears to have direct effects on the real economy. The obvious impact is that home building declined. The end of the housing bubble resulted in a decline of nearly three-fifths in real residential investment between a peak in the fourth quarter of 2005 and a trough in the second quarter of 2011. Chart 6 shows the ratio of current-dollar residential housing investment to gross domestic product (GDP). Historically, housing has been highly cyclical. Expansions are associated with increasing housing construction, and recessions are associated with declines. Recently, this pattern has weakened. In the 2001 recession, the ratio of residential investment to GDP did not decline. While there was a large expansion of residential investment in the mid-2000s, its share of GDP was not much higher than in previous peaks. However, the post-bubble decline was much larger than in the previous recessions since 1959, even in the very deep recession of 1973–75 and the paired recessions of 1980 and 1981–82.

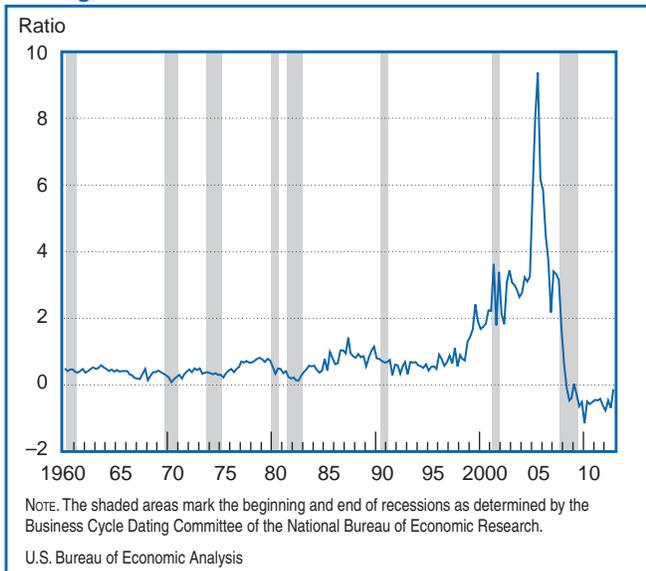## Chart 3. Ratio of New Mortgage Debt to Household Saving, 1960–2012

Ratio

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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Chart 5. Ratio of Mortgage Debt to Compensation of Employees, 1960–2012

Ratio

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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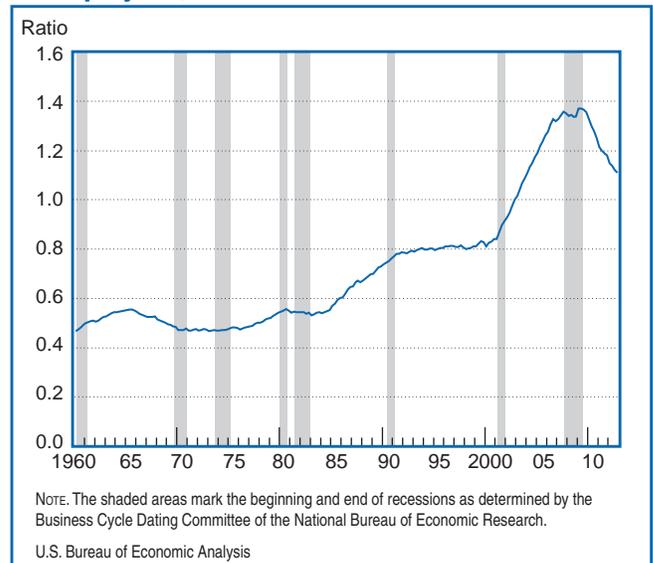
Chart 4. Ratio of Household Saving to Total Mortgage Debt,1960–2012

Ratio

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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Chart 6. Ratio of Residential Investment to GDP, 1959–2011

Ratio

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

U.S. Bureau of Economic Analysis
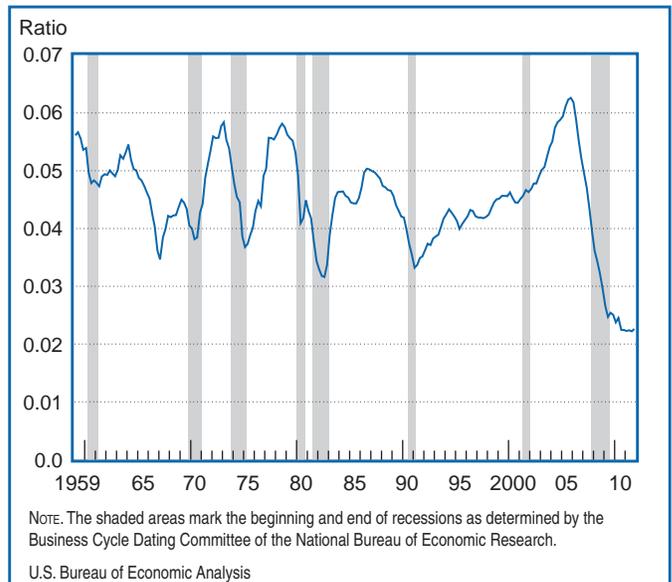
This fall in housing investment has hurt overall investment. Chart 7 shows the ratio of net investment to net production. Part of gross investment just replaces capital lost to deprecation. (Gross measures are those that include depreciation, while net measures remove it.) Net measures give a better sense of how much more capital will be available for future production. In the recent recession, net investment dropped to historic lows. Though nonresidential investment has also fallen, residential investment has typically been a significant portion of total investment, so its collapse had a large aggregate impact.

The collapse of the housing market may also have had indirect effects. Recall that falling housing prices led to a debt overhang, which in turn can have a negative impact on consumption. The household has to put additional spending into building up equity, which cannot be used on consumption. Dynan (2012) finds that households with the largest fall in house prices cut their consumption the most. Falling house prices can also reduce household consumption by reducing household wealth. Case, Quigley, and Shiller (2012) find evidence of this effect in the most recent recession, but not in previous recessions.

Housing is not the only potential area for debt to have an impact on the household balance sheet. Some observers have suggested that innovations in credit products led to increased leverage in markets outside the residential housing market. However, the leverage issues appear to be largely confined to the residential housing sector. Chart 8 shows the ratio of short-term loan liabilities to disposable personal income. This ratio gives a sense of how much consumption other than housing was financed by credit. Although the ratio increased in the 1990s, it remained stable through the

housing boom and bust.[4] Therefore, it does not appear that households leveraged their consumption expenditures significantly.

Although the amount of leverage has not increased in the most recent years, there is evidence of increasing credit use from 1983 to 2006. Chart 9 shows the ratio of credit services used by households—the imputation of financial services furnished without payment and explicit fees for financial services—to disposable personal income. This ratio has increased over time, though it has tended to drop during recessions.

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4. Another source of leverage that many people were concerned about was the use of home equity loans to fund nonhousing consumption. The data in the IMAs only show total mortgage levels and flows. They do not allow us to distinguish what share of mortgage debt was used in this way.

Chart 8. Ratio of Short-Term Loan Liabilites to Disposable Personal Income, Household Sector, 1960–2012
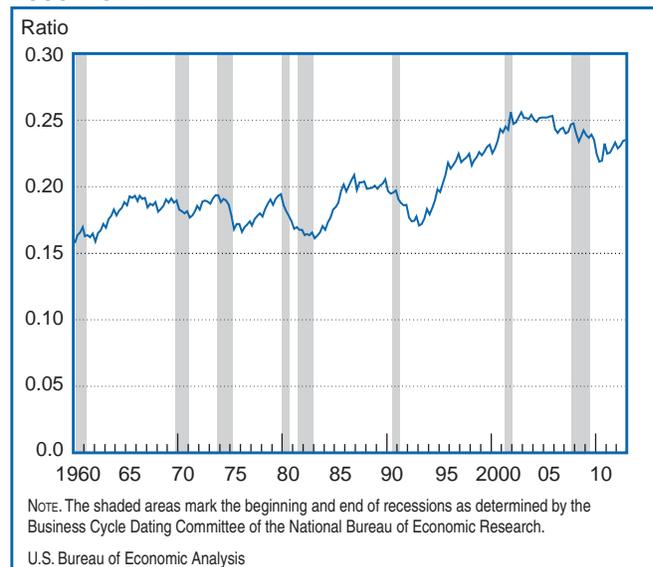

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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Chart 7. Ratio of Net Investment to Net Production, 1960–2011

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

U.S. Bureau of Economic Analysis
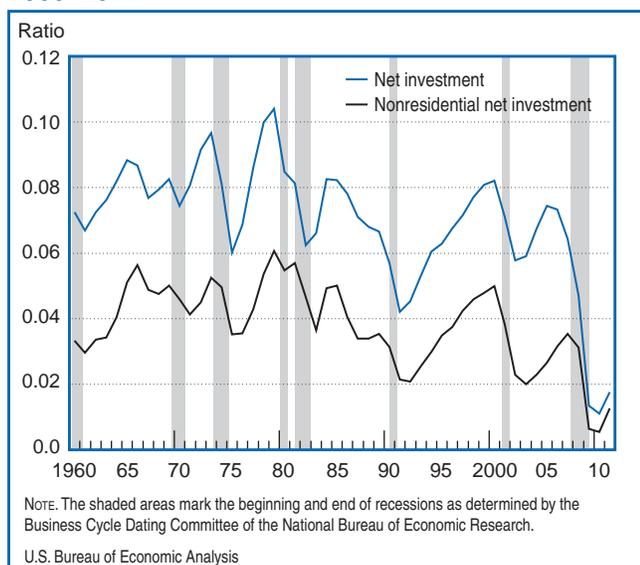
Chart 9. Ratio of Credit Services to Disposable Personal Income, Household Sector, 1960–2011

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

U.S. Bureau of Economic Analysis
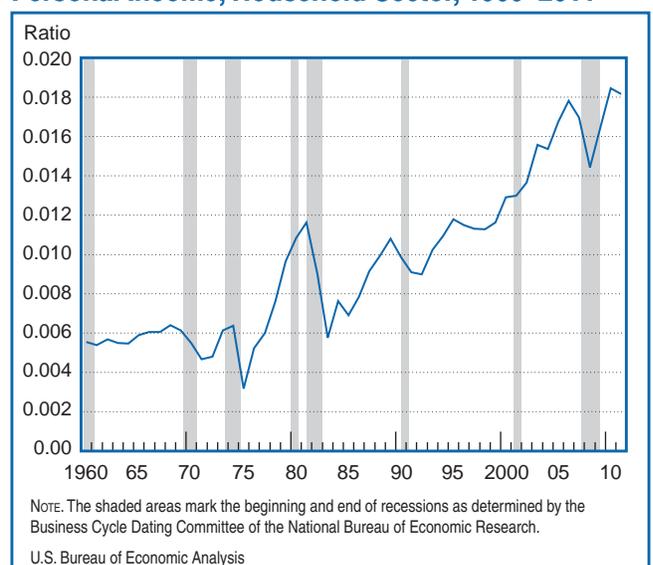
Anticipating Shocks: An Aggregate Economic Approach

One theory of recessions is that if the economy is growing above its long-run capacity, it is in danger of falling into recession. Like an overworked engine, the economy can overheat and break down.

One approach would be to compare a measure of the economy's potential output with the economy' actual output. Chart 10 shows the ratio of the average of real GDP and real gross domestic income (GDI) to the Congressional Budget Office's (CBO's) estimates of potential real GDP, a measure of the economy's capacity.
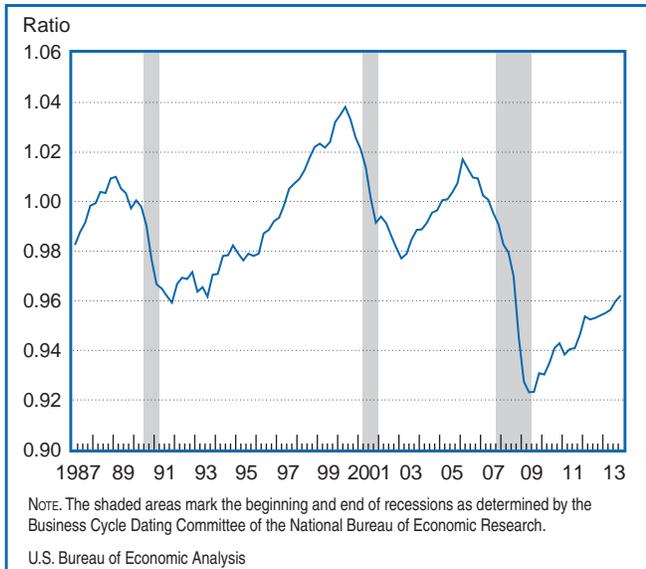
This ratio has exceeded 1.0 before every recession since 1950. It nearly always peaked and started to decline before the start of recessions. However, the ratio has also peaked and then declined a few times when recessions did not follow soon after the peak.

Real GDP and GDI are published by BEA quarterly, beginning with 1947. The average of GDP and GDI has some statistical properties that are compelling; in particular, the average is somewhat less volatile from quarter to quarter than either measure alone. The denominator is the CBO's quarterly measure of potential activity (real GDP); it is available beginning in 1949.

Although a measure of potential GDP is not currently published by BEA, the methodology appears to be similar to work done at BEA more than two decades ago.[5]

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5. For example, see de Leeuw and others (1980).
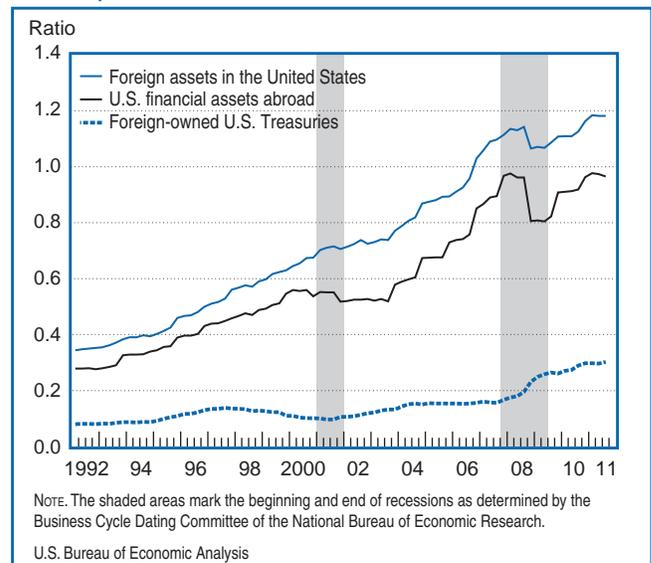
Predicting Contagion

Once a shock occurs, its ultimate impact depends on how it is transmitted to other parts of the economy or to other countries; that is, it depends on contagion. The recent recession was notable for being globally widespread. Typically, some countries suffer a bad recession while others do not experience a recession at all. The recessions that have the biggest impact are those that spread to every corner of the economy and all over the world. As a result, policymakers and others are interested in indicators of contagion. In this section, we examine contagion across borders and across domestic sectors using data from BEA's ITAs, regional accounts, and industry accounts.

Cross-border activity

The U.S. economy has become more integrated with the rest of the world. Such globalization takes on many interrelated forms. One example is the increasing importance of international trade as a share of the U.S. economy. The ratios of both imports and exports to GDP increased from roughly 10 percent in the early 1990s to about 11 percent for exports and 16 percent for imports in the years immediately before the 2007–2009 recession.

Another aspect of globalization is the increase in the importance of cross-border financial assets in the economy. Chart 11 shows the ratio of financial assets held across borders to GDP. Both foreign-owned U.S. assets and U.S.-owned assets abroad have increased substantially relative to GDP. The recent financial crisis slowed this growth, but the level of financial integration has returned to its precrisis levels.

Chart 10. Ratio of Average Real GDP and Real GDI to Potential Real GDP, 1987–2013

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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Chart 11. Ratios of Cross-Border Financial Assets to GDP, 1992–2011

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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The increasing importance of the global economy raises the concern that negative shocks from abroad could be transmitted to the United States. Since the channels are much larger, foreign shocks that might have had minor impact on the domestic economy in the past could be very important.

One area of concern is that the United States has persistently run a current-account deficit. The current-account balance is the difference in income from returns on U.S. investment and sales of goods and services abroad (exports) less payments abroad and sales of goods and services to Americans (imports). The United States has run a current-account deficit since the early 1980s. Chart 12 shows the ratio of the current-account deficit to GDP, beginning in 1992.

Some international economists have raised concerns about this imbalance. Krugman (2007) and Obstfeld and Rogoff (2007), among others, argue that the process of balancing will be abrupt and damaging to the economy. One way that the current account can be brought back into balance is for the U.S. currency to depreciate. A depreciated currency means imports become more expensive and exports cheaper. The speed at which the currency depreciates makes a big difference in the impact on the real economy. Rapid declines typically lead to recessions. Producers and retailers who depend on imported goods suddenly face much higher costs. They must search for domestic replacements, which may not yet have sufficient capacity to serve them or even to exist. This process of reallocating productive resources from import-intensive parts of the economy to export-intensive parts can be costly and slow.

On the other hand, if the adjustment is slow, the real economy has time to adjust without import users sud-denly being caught short. Bertaut, Kamin, and Thomas (2009) argue that the current-account deficit can be sustained for decades longer and that the adjustment will be slow.

The financial crisis provides some evidence about which way is more likely. The deficit was increasing going into the period of financial crisis, but it started to decline prior to its full onset in 2008 after peaking in 2006. The deficit has since declined to levels not seen since the 1990s. The biggest mover of the current-account deficit is net exports, or the trade deficit. The trade deficit has begun to grow again recently, but increasing income from the rest of the world has kept the current-account deficit from growing.

Interestingly, the U.S. dollar appreciated during the initial stages of the international crisis. The U.S. government has an international reputation as reliably paying its obligations. During the uncertainty of the crisis, investors sought safe assets. U.S. assets are seen by investors as being safer than alternative assets abroad. This "flight to quality" led to a surge in U.S. Treasuries held abroad. Chart 13 shows the ratio of the stock of U.S. Treasuries held abroad to GDP. This ratio jumped in 2008 as the financial crisis increased the demand for such safe assets.

While the impact of the financial crisis is evidence for the slow adjustment hypothesis, it does not mean that the current-account deficit is benign. The deficit may flow into other areas of the economy. For instance, Ferrero (2012) argues that it may have helped inflate the housing bubble. In addition, previous experience does not mean investors will not change their minds. They may no longer see U.S. assets as reliable as they did in the past, leading them to pull out.

Another way international integration could harm the domestic economy is through an increase in cross-

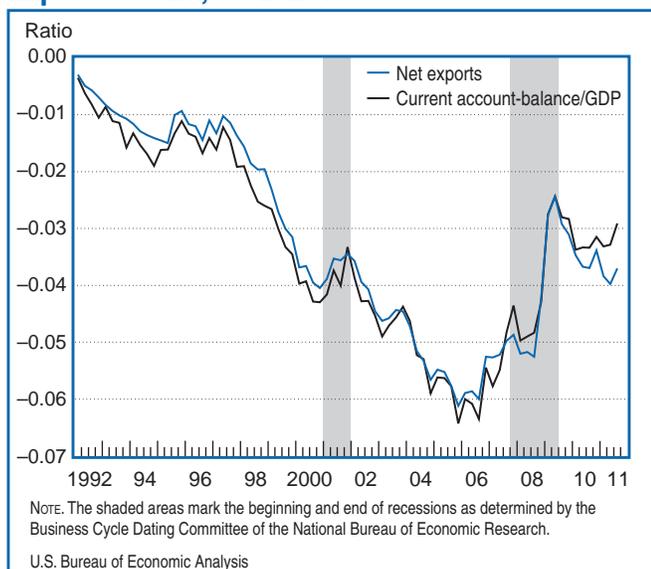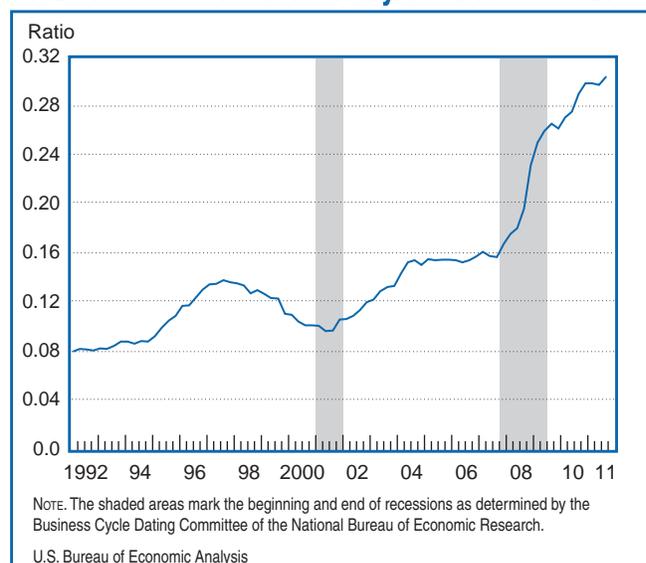## Chart 12. Ratios of Current-Account Deficit and Net Exports to GDP, 1992–2011

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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Chart 13. Ratio of U.S. Treasury Securities to GDP

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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border financial asset holdings that might expose the domestic financial sector to foreign financial shocks.

One way foreign shocks can be transmitted is through movements in exchange rates. If a financial institution holds assets denominated in a foreign currency and that currency depreciates, the value of that asset falls in U.S. dollar terms. Depreciation means that the foreign currency buys fewer dollars. So when the institution sells the asset and repatriates the returns, the transaction generates fewer dollars.
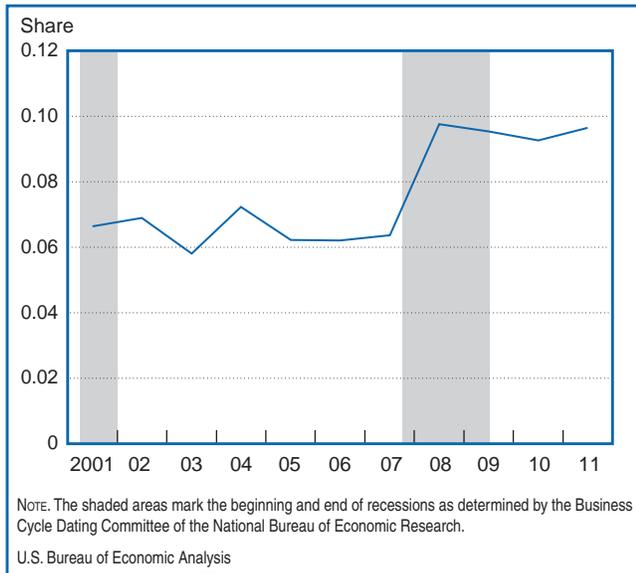
A measure of the exposure to such risk is the share of foreign assets that are denominated in a foreign currency. As can be seen in chart 14, very little of U.S. fi-

nancial institutions' overseas financial assets are denominated in foreign currencies. While this share has increased, it remains below 10 percent. Movements in the exchange rate do not directly affect 90 percent of such assets.

Another measure of foreign exposure is the share of assets held as foreign assets. Chart 15 shows foreign assets as a share of U.S. financial assets (regardless of currency denomination). Again, this share is low but growing.

To be sure, the stature of the U.S. dollar in the global economy helps insulate the U.S. economy from international shocks. The United States accounts for a large share of world economic output, which leads to many international transactions being denominated in U.S. dollars. In some sectors, such as oil, goods are priced in dollars even when no U.S. company is a party to the transaction. There is a great deal of demand for U.S. dollar-denominated assets abroad. Therefore, U.S. companies are subject to less currency risk than their counterparts abroad.

Regional and industry activity

Contagion within subsectors of the economy can also be explored using BEA regional and industry data.

Even in times of broad-based and sustained economic growth, some areas of the economy are usually in decline. Viewed from this perspective, recessions often occur when the number of areas and industries in decline increases. Indeed, the number of areas and industries in decline tends to increase before the beginnings of recessions.

The number of states experiencing declines in real personal income less transfers can thus be seen as a pressure indicator (chart 16). This income measure is a

Chart 14. Share of U.S. Claims Denominated in Foreign Currencies by U.S. Banks and Securities Dealers

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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Chart 15. Share of Assets Held Abroad by U.S. Financial Institutions

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

U.S. Bureau of Economic Analysis
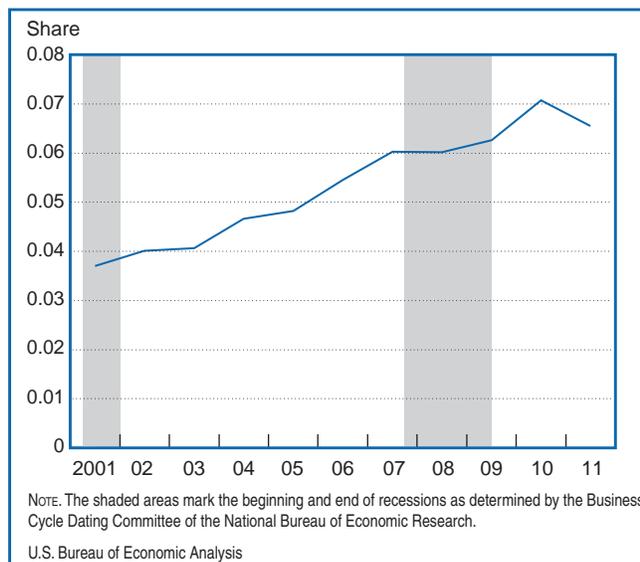
Chart 16. Number of States Experiencing Declines in Real Personal Income Less Transfers, 2006–2011

NOTE. The shaded areas mark the beginning and end of recessions as determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

U.S. Bureau of Economic Analysis
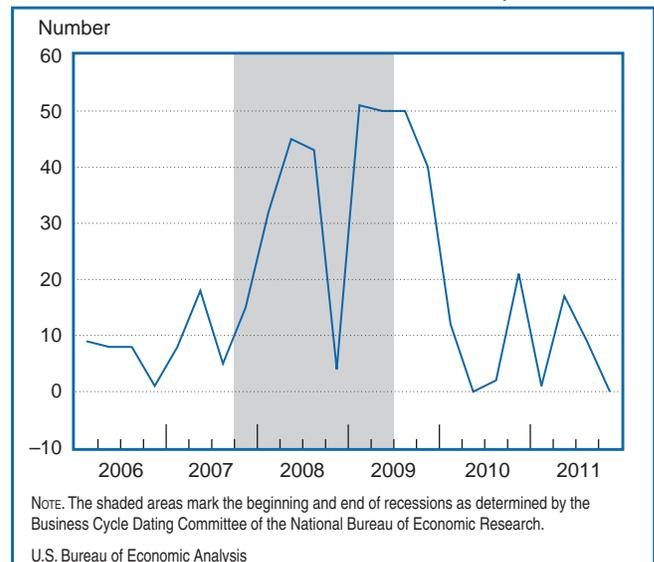
quarterly geographic disaggregation of a monthly BEA series that is used (along with other monthly measures) by the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) in determining when cyclical peaks and troughs occur.
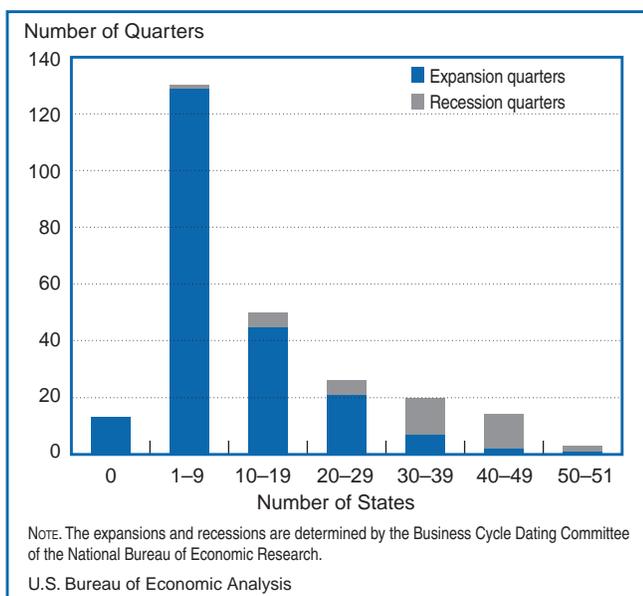
Information to calculate this measure quarterly is available for 1947 forward.[6] It is a simple count of the number of states experiencing declines.[7] This count is highly volatile from quarter to quarter. There have been numerous local peaks and troughs even in periods of sustained growth in the national economy. For example, the number of states in decline exceeded 20 in one quarter in 1994 and in two quarters in 1995; however, the subsequent recession did not occur until 2001. Typically, the number of states experiencing declines tends to rise before recessions, but due to the volatility of counts, it is probably best used in the context of other pressure indicators, such as the ratio of real GDP and real GDI to potential real GDP. For example, a dip in the fourth quarter of 2008 resulted from very sharp decreases in energy prices in that quarter.

To put this measure in context, chart 17 offers a histogram of the numbers of states that are experiencing declines in real income less transfers in each quarter for 1948–2011. Only 13 quarters have no states experiencing declines. But 150 quarters have between one and nine states experiencing declines, and 50 quarters

have between 10 and 19 states experiencing declines. Only 3 quarters have 50 to 51 states. Over all the quarters, an average of 13.4 states experienced declines. Using NBER's determinations of the cyclical peaks and troughs, an average of 9.4 states experienced declines in quarters that do not contain recessions, and an average of 33.4 states experienced declines in quarters that do contain recessions.

The number of industries experiencing declines in real value added can be seen as a similar pressure indicator.

Annual estimates of real value added by industry are published by BEA for 1947 forward. A review, which include all the 65 two-digit North American Industry Classification System industries that make up the U.S. economy, indicates that the number of industries in decline tends to increase in advance of the beginnings of recessions. Annual estimates, however, are of limited predictive value, and the number of industries in decline tends to be highly volatile, with some local peaks at times that do not immediately precede recessions. Quarterly industry value-added estimates are available at the level of detail of 21 industries for 2007 forward. While the quarterly series might prove a useful pressure measure, the timeliness of these estimates may not allow that.

Both measures face a similar problem: some states and industries are much larger components of the U.S. economy than others. Also, the specific states or industries that are declining change from quarter to quarter. Weighted numbers would likely be superior to simple counts. Measures of trend weights or shares would have to be developed to enable such weighted counts.

Conclusion

In this article, we discussed how BEA data can be used to generate new indicators that might shed additional light on critical business cycle dynamics, with an eye toward better anticipating major economic dislocations. While no single indicator is likely to able to predict recessions, well-constructed sets of indicators could provide early warning signals, shedding light on emerging risks in important asset classes, important sectors, and geographic regions. Drawing together financial and real statistics into a cohesive whole provides a more complete picture of potential weakness in the economy.

6. The quarterly state-level estimates are published in current dollars, and the real estimates are obtained by deflating the current-dollar estimates by the published price index for personal consumption expenditures.

7. The District of Columbia is counted as if it were a state in the state-level estimates for our analytical purposes.

Chart 17. Number of States With Declining Real Personal Income Less Transfers in Each Quarter, 1948–2011

NOTE. The expansions and recessions are determined by the Business Cycle Dating Committee of the National Bureau of Economic Research.

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