Labor market fluctuations in Japan and the U.S.— How similar are they?

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Are business cycles across countries alike? Are there similarities in the dynamics of labor markets across countries? How important are different types of shocks in explaining these dynamics?

In this article, we try to answer these questions by examining the sources of labor market fluctuations in Japan and the U.S. in the post-1972 period. In particular, we focus on unemployment and job vacancies in the two countries and examine how sectoral and aggregate shocks affect the relationship between these variables.

Trying to assess the relative importance of various types of shocks—real versus nominal or aggregate demand versus aggregate supply—has been the focus of much recent work on business cycles. Although most of these "business-cycle accounting" exercises have been carried out within the context of a closed economy, with much of the evidence coming from U.S. data, a number of recent studies have carried out similar exercises for other economies.[1] As stated by West (1992), "apart from the intrinsic interest in sources of fluctuations in other countries, such work could, in principle, shed light on theories of the business cycle that purport to explain fluctuations in market economies in general."

The Japanese economy provides a particularly interesting opportunity to assess whether similar forces shape economic fluctuations in different countries. Some observers argue that there are intrinsic and qualitative differences between the economic, financial, and legal structures of Japan and those of the U.S. These differences may affect the relative importance and propagation of various economic shocks. For instance, while trade flows account for a small fraction of Japanese gross national product (GNP), results in West (1992, 1993) and Kaneko and Lee (1995) indicate that the fractions of movements in Japanese output, inventories, and stock returns accounted for by external shocks (such as changes in exchange rates, oil prices, and foreign output) are much greater than in the U.S.

Another difference that is commonly pointed out is the behavior of the Japanese unemployment rate. For a variety of reasons, reviewed below, the Japanese unemployment rate historically has been lower and more stable than the U.S. rate. Given this and other differences between the two countries' labor markets, how similar are they in their responses to various shocks?

We focus on one aspect of labor markets, the relationship between job vacancies and unemployment. According to economic theory, the different rates of job creation and job loss

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in the economy, the cost of conducting a job search, and the mismatch between jobs and workers result in a steady-state level of unemployment and vacancies. Furthermore, aggregate and *sectoral* (that is, shifts in relative demand for different types of labor) shocks to the economy result in different movements in the relationship between vacancies and unemployment.

We examine the sources of fluctuations in Japanese and U.S. unemployment rates and vacancies and focus on shocks that economic theory and prior empirical evidence suggest are important: sectoral, external, output, and monetary shocks. Throughout our analysis, which is implemented by a six-variable recursive vector autoregression (VAR), we pose two general questions: Do unemployment and vacancies in Japan and the U.S. respond to shocks in a manner that is broadly consistent with economic theory? Are the responses of Japanese and U.S. variables to shocks similar?

Overall, our results suggest that despite the differences that may exist between Japanese and U.S. labor markets, unemployment and vacancies in the two countries respond similarly to aggregate disturbances. Responses to sectoral and external shocks differ to some extent across the two countries. In addition, there are some differences in the relative importance of various shocks in explaining movements in unemployment and vacancies. While monetary policy shocks in the U.S. account for a significant fraction of the labor market fluctuations, external and aggregate output shocks account for the greatest fraction of fluctuations in Japan. These results suggest that theories of labor market fluctuations are successful in explaining fluctuations in labor markets with different structures and characteristics.

Below, we briefly discuss the implications of economic theory for the effects of aggregate and sectoral shocks on vacancies and unemployment. Then we describe the data and methodology we use and present our empirical results.

Vacancies, unemployment, and economic shocks—The Beveridge curve

What are the sources of fluctuations in unemployment and why are people looking for work at the same time that there are unfilled jobs? A mismatch between jobs and workers and sectoral shocks may partly explain the coexistence of vacancies and unemployment. According to mismatch theories, the characteristics of workers (such as their skill levels and geographic and industry locations) do not exactly match the requirements of unfilled jobs. Moreover, if a sectoral shock alters the relative demand for different types of labor and it is costly to shift resources across sectors, skill levels, or locations, then the relationship between unemployment and vacancies may change even in the absence of an aggregate shock.[2]

Consider the dynamic effects of aggregate and sectoral shocks starting from equilibrium levels of unemployment and vacancies. In the case of an aggregate shock that lowers profitability across all sectors, jobs would become unprofitable and firms in all sectors would reduce employment and vacancies. Thus, in the short run, unemployment would rise and vacancies would decline. Conversely, a favorable aggregate shock that increases profitability (hence, labor demand) in all sectors would lead to a decrease in unemployment and an increase in vacancies.

The responses of unemployment and vacancies to aggregate shocks are illustrated by the Beveridge curve (Beveridge, 1955) in figure 1. Starting from an equilibrium point A on curve I, adverse aggregate shocks move the economy along the curve to a point, B, where unemployment is higher and vacancies are lower. A favorable aggregate shock, on the other hand, moves the economy to a point, C, where unemployment is lower and vacancies are higher.

FIGURE 1

The Beveridge curve

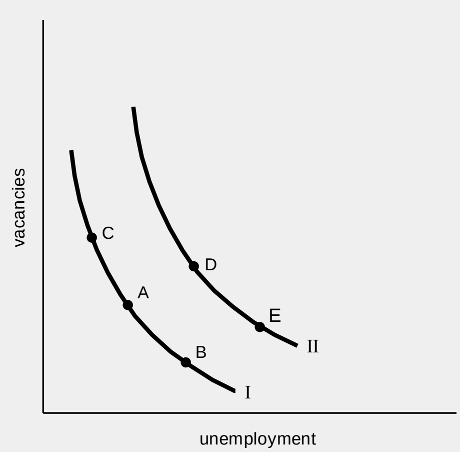
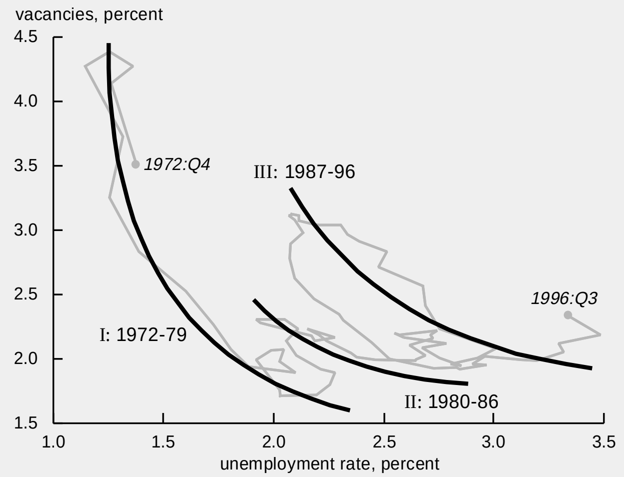


FIGURE 2

The Japanese Beveridge curve, 1972Q4–96Q3



Sources: The Ministry of Labor, the Economic Planning Agency, and the Management and Coordination Agency of Japan.

Now, consider the effects of a sectoral shock in an economy in which productive inputs are quasi-specific to their current place of employment (that is, specific to their geographical location, skill requirements, or sectors). Assume that as a result of a shock, some sectors become more profitable while others become less profitable, and relative demands for labor across sectors change. After the shock, the desired and actual levels of productive inputs are not as closely matched and inputs need to be reallocated from unprofitable to profitable sectors. Because this reallocation is costly, unemployment increases in the short run. In other words, sectoral shocks shift out the Beveridge curve to the right, represented by the movement of curve I to curve II in figure 1.

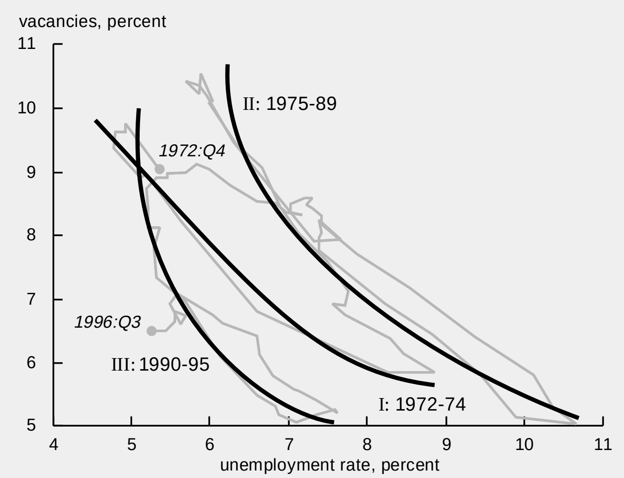
The response of vacancies to a sectoral shock depends on a number of factors: the rate of job destruction in adversely affected sectors, the rate of job creation in newly profitable sectors, how fast resources can move across sectors, and the process through which workers search for and are matched to jobs. If, for example, productive inputs that are complementary to labor in the newly profitable sectors, such as capital, are fairly mobile, then labor demand in these sectors would increase soon after the shock, leading to an increase in vacancies. In other words, both aggregate unemployment and vacancies would increase in response to a sectoral shock, represented by a move from point A on curve I to point D on curve II.

If, on the other hand, reallocation of sector-specific resources to the newly profitable industries takes time or is costly, then vacancies in these sectors would increase gradually. In the short run, aggregate vacancies would decline in line with fewer vacancies in the adversely affected sectors. In such cases, a sectoral shock would shift the economy from point A on curve I in figure 1 to point E on curve II, where unemployment is higher, but vacancies are lower.

Hence, whether unemployment and vacancies move in the same direction or in opposite directions depends on the structure of the economy; however, most studies that examine the sources of fluctuations in unemployment

FIGURE 3

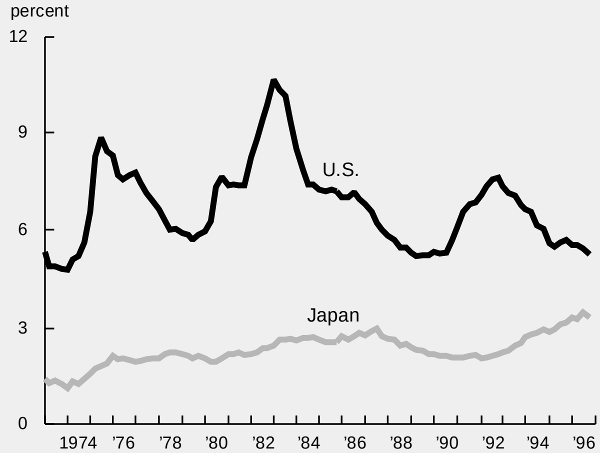
The U.S. Beveridge curve, 1972Q4–96Q3



Sources: U.S. Department of Labor, Bureau of Labor Statistics, and U.S. Department of Commerce, Bureau of Economic Analysis.

FIGURE 4

Unemployment rates in the U.S. and Japan, 1972Q4–96Q3



Sources: See figures 2 and 3.

identify aggregate shocks with negative co-movements in unemployment and vacancies, and sectoral shocks with increases in both of these variables.[3]

Figures 2 and 3 plot the Beveridge curves for Japan and the U.S. from 1972 to third-quarter 1996. These Beveridge curves have shifted over time, suggesting that sectoral shocks may be important in explaining fluctuations in these markets.

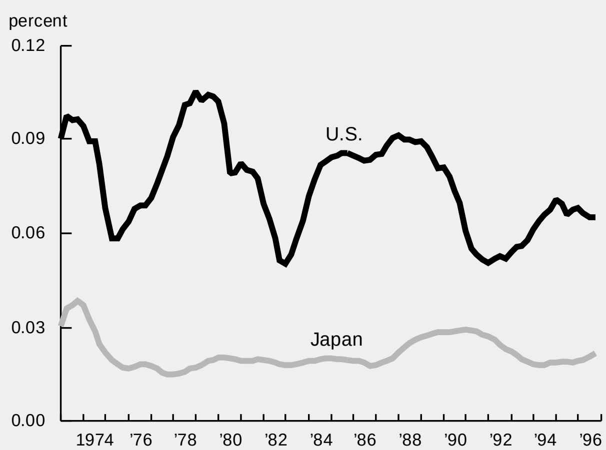
Moreover, empirical evidence in Blanchard and Diamond (1989) and Brainard and Cutler (1993) indicates that aggregate shocks move the U.S. economy along the Beveridge curve, whereas sectoral shocks shift out the curve, consistent with the predictions of theory. Brunello (1991) and Sakurai and Tachibanaki (1992) examine how the relationship between Japanese unemployment and vacancies relate to a mismatch between jobs and workers. The results of these studies suggest that the Japanese Beveridge curve has shifted out over the years, as has the U.S. curve. Brunello reports that regional and age mismatches between jobs and workers do not explain the shift in the Beveridge curve, but an age mismatch helps explain the dynamic paths of unemployment and vacancies from one long-run equilibrium to another.[4] Sakurai and Tachibanaki find that about 20 percent of Japanese unemployment is due to mismatches by region or age. However, these studies do not analyze the sources of fluctuations in unemployment and vacancies over the business cycle.

An interesting question is whether aggregate and sectoral shocks have similar effects in Japan and the U.S. where labor markets have different features. One of the well-known features of the Japanese labor market is the peculiar behavior of its unemployment rate. The Japanese unemployment rate is very low and, for a variety of reasons, it fluctuates within a fairly narrow range over the course of a business cycle (figure 4).[5] Similarly, the time path of Japanese vacancies is more stable than that of vacancies in the U.S. (figure 5).

Numerous writers have pointed out that this stability is achieved largely by shifting the burden of adjustment to other labor market variables. Compared with other economies, the Japanese labor market accommodates adverse labor demand

FIGURE 5

Vacancies in the U.S. and Japan, 1972Q4–96Q3



Sources: See figures 2 and 3.

TABLE 1

Descriptive statistics for the U.S. and Japanese labor markets, 1972Q4–96Q3

	U.S.		Japan	
	Mean	Standard deviation	Mean	Standard deviation
Unemployment rate (%)	6.764	1.309	2.318	0.495
Vacancies (%)	0.076	0.015	0.022	0.005
Real wages	0.080	0.004	0.816	0.077
GNP growth rate (%)	0.647	0.940	0.851	0.864

Notes: In the U.S., the unemployment rate is the rate for the civilian labor force; vacancies are the ratio of the help-wanted index to total employment; real wages are the ratio of average hourly earnings for private nonagricultural workers to urban consumer price index for all items (CPIU); and the real GNP growth rate is based on the chain-weighted GNP in 1992 dollars. In Japan, the unemployment rate is the totally unemployed ratio; vacancies are the ratio of job offers (unfilled vacancies registered with public employment offices) to total employment; real wages are the ratio of an index (1995=100) of wages, salaries, and bonuses to the general consumer price index (1990=100); and the real GNP growth rate is based on GNP in 1990 dollars. GNP numbers are reported quarterly; all other series are quarterly averages of monthly data.

Sources: See figures 2 and 3.

shocks by a smaller increase in the measured unemployment rate, but a greater decline in wages, participation rates, and average hours (Weiner, 1987). Because nominal and real wages fluctuate a lot more in Japan over the course of a business cycle than they do in the U.S., labor inputs in Japan need not change as much to accommodate shocks. For instance, Brunello (1990a) and Taylor (1989) suggest that the sensitivity of real wages to shocks is much higher in Japan than in other countries and that this translates into smaller employment fluctuations.[6]

The statistics in table 1 illustrate these characteristics of the Japanese labor market over the post-1972 period. Compared with the U.S., the unemployment rate and vacancies in Japan have lower means and lower standard deviations. Conversely, real wages in Japan are more variable than real wages in the U.S.

Next, we examine the responses of unemployment and vacancies to various shocks to see if sources and patterns of fluctuations in Japanese and U.S. labor markets are similar and consistent with the theory outlined above.

Methodology and data

VARs have become a commonly used way of summarizing the interactions among a set of variables. In this article, we follow Sims' (1992) approach and estimate a six-variable VAR that is based on a recursive ordering of the variables.[7] Specifically, we estimate a baseline VAR with two lags, ordered as (*INT, VAC, UNEMP, DISP, GNP, TOT*), where *INT* is a measure of monetary policy shocks, *VAC* is vacancies, *UNEMP* is the unemployment rate, *GNP* is the growth rate of real GNP, *DISP* is a measure of sectoral shocks, and *TOT* is a measure of external shocks.[8] We define and measure the variables (all in logs) over the 1972Q4–96Q3 period as follows.[9]

Vacancies

For the U.S., we measure vacancies by the ratio of help-wanted index to total employment (*VAC-US*). Similarly, Japanese vacancies (*VAC-JP*) are measured by the ratio of job offers, which are unfilled vacancies registered with the public employment offices, to total Japanese employment.

Unemployment

Unemployment in the U.S. is the unemployment ratio for the civilian labor force reported by the U.S. Department of Labor. Japanese unemployment is measured by the totally unemployed ratio as reported by the Ministry of Labor.

Industry-specific shocks

If the movement of labor and capital across industries is costly, industry-specific shocks that alter the pattern of demand across sectors can lead to a temporary increase in unemployment. Since industry-specific shocks can arise from a variety of sources, identifying such shocks represents an empirical challenge.[10]

In this article, we use dispersion of returns on industry stocks to identify industry-specific disturbances, as in Loungani, Rush, and Tave (1990) and Loungani and Trehan (1997 forthcoming). According to the efficient markets hypothesis, new information on the current and future profitability of firms and their sectors is immediately incorporated into stock prices. Thus, our dispersion index is likely to move closely with the arrival of information on industry profitability.

Let R_{it} denote the stock return in industry i in period t and R_t denote the stock return for the market as a whole. We then define the stock market dispersion index as:

$$1)\quad DISP_t = \left[\sum_{n=1}^{N} w_i [R_{it} - R_t]^2 \right]^{1/2},$$

where N is the total number of industries and w_i is a weight based on the industry's share in total employment.[11]

For Japan, the index (*DISP-JP*) is constructed using stock return data for 36 industrial sectors (R_{it}'s); the market return, R_t, is constructed using the Nikkei 500 index; and the employment shares are calculated based on 1986 data. For the U.S., the index (*DISP-US*) is calculated based on S&P 500 returns and industry employment shares in 1978.

Output shocks

Our primary measure of aggregate shocks is the growth rate of GNP. For the U.S., we use chain-weighted GNP in 1992 prices (*GNP-US*) and for Japan, we use GNP in 1990 prices (*GNP-JP*).

Monetary policy shocks

Views about how to identify monetary policy shocks have undergone significant revision in the last few years. The work of Bernanke and Blinder (1992), Christiano and Eichenbaum (1992), and Strongin (1995) has established that innovations in either the federal funds rate or in nonborrowed reserves are better measures of shocks to U.S. monetary policy than the innovations in monetary aggregates that were widely used in earlier work. Evidence on the importance of monetary policy shocks in explaining U.S. business cycle fluctuations is mixed. For instance, Christiano, Eichenbaum, and Evans (1996) find that policy shocks in the federal funds rate and nonborrowed reserves account for 30 percent and 11 percent of the variations in gross domestic product (GDP), respectively. On the other hand, Leeper, Sims, and Zha (1996) find that the effects of monetary policy shocks vary depending on how they are modeled and that in most of the model specifications, monetary policy shocks account for a small fraction of the variations in macroeconomic aggregates. Empirical evidence on the impact of Japanese monetary policy also varies. While Moreno (1992), Moreno and Kim (1993), and Shioji (1993) find that innovations in money supply and interest rates explain a significant fraction of the movements in Japanese output and prices, West (1992) finds that money supply shocks play a small role in output and price fluctuations.[12]

We identify monetary policy shocks as innovations in an instrument of monetary policy. Our approach mimics the strategy outlined by Eichenbaum and Evans (1995) in their investigation of the impact of U.S. monetary policy shocks on bilateral exchange rates. Following Eichenbaum and Evans, we view the monetary authority as choosing the value of a monetary instrument at time t, V_t, as a linear function of its information set, Ω_t. The monetary policy shock (ϵ_{vt}) is the disturbance term in this "decision rule," that is,

$$2)\quad V_t = F(\Omega_t) + \epsilon_{vt}.$$

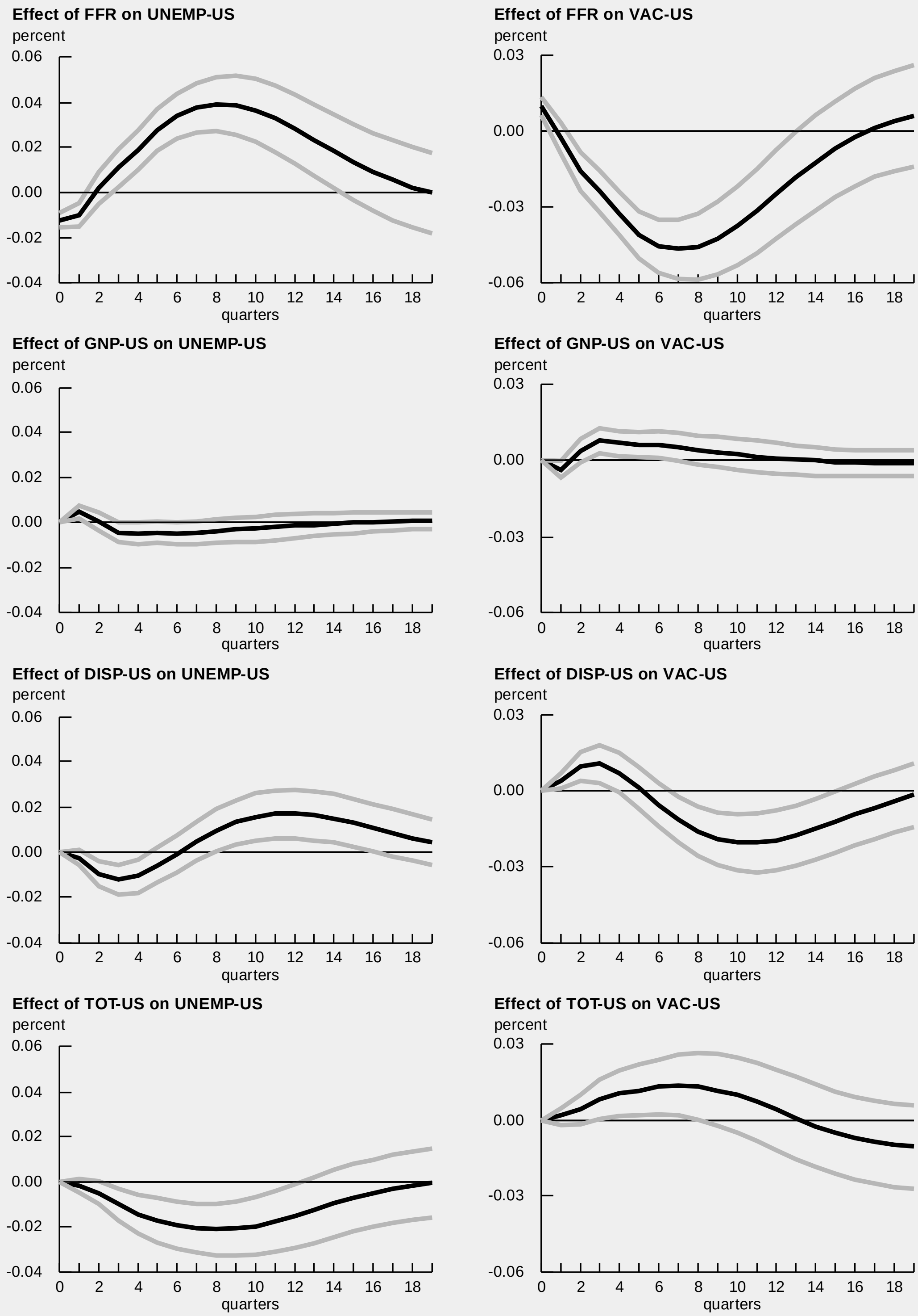
To make this procedure operational, we have to choose an empirical analog for the policy instrument, V_t, and decide on variables to include in the information set. Based on the conclusions of other studies in this area, we use the federal funds rate for the U.S. (*FFR*) and the Bank of Japan's call money rate (*CALL*) as the policy instruments. In our baseline specification, we assume that the information set consists of lagged values of the other variables included in the VAR; however, we did some robustness checks to ensure that the inclusion of contemporaneous values of a subset of those variables does not alter the main results (see note 8).

External shocks

As noted in the introduction, previous studies (Kaneko and Lee, 1995; West, 1992, 1993) have found that external shocks account for a greater fraction of the variations in Japanese output, inventories, and stock returns than they do in the U.S. On the other hand, Brunello (1990b) finds that the influence of real exchange rate movements on Japanese employment was much smaller than their influence on U.S. employment during the 1973–86 period. We measure external shocks with the ratio of

FIGURE 6

Impulse response functions in the U.S.

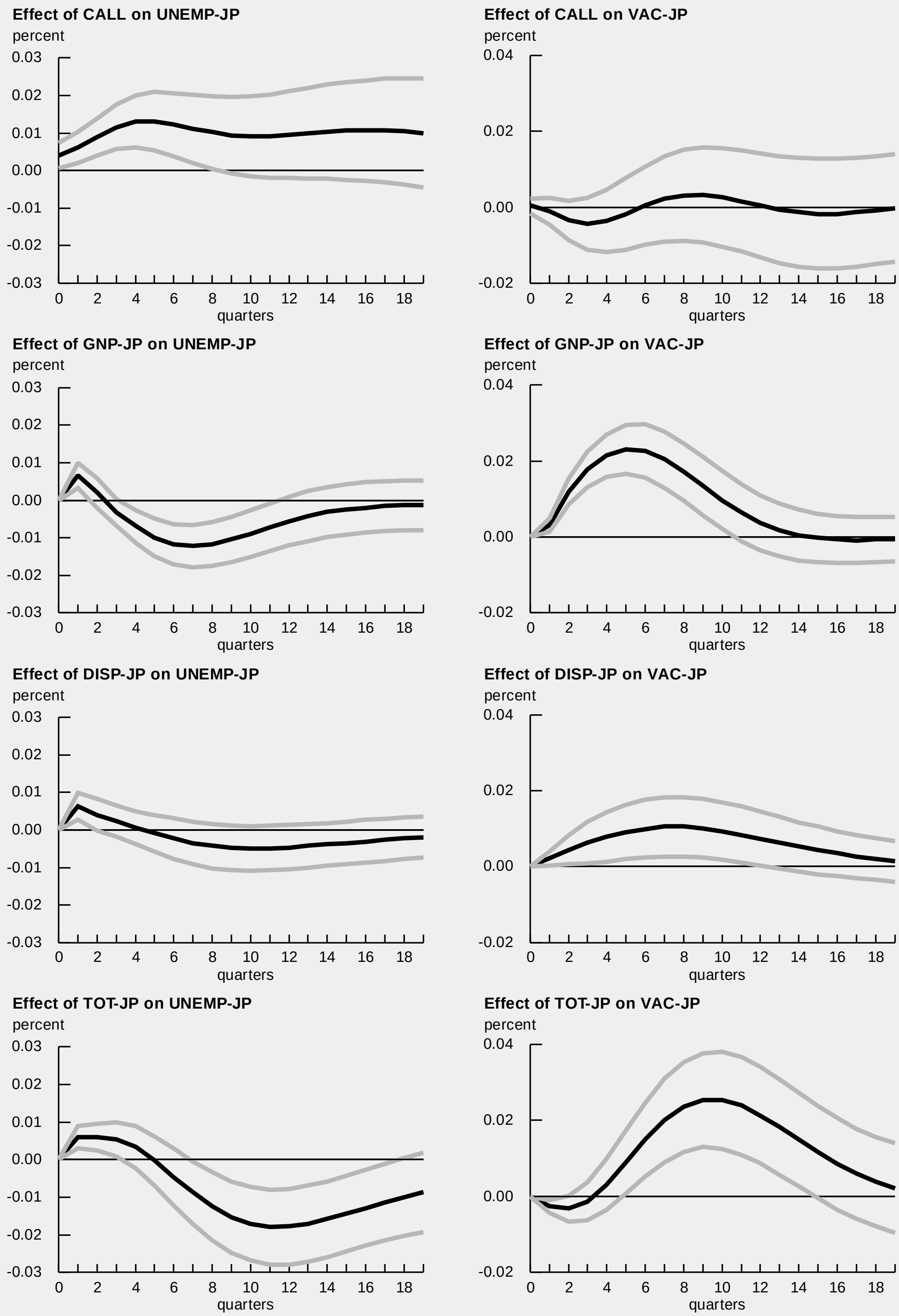


Notes: *VAC-US* is the log of the ratio of the U.S. help-wanted index to total employment; *UNEMP-US* is the log of the ratio of total unemployment to total labor force; *FFR* is the U.S. federal funds rate; *DISP-US* is a measure of sectoral shocks; *GNP-US* is the growth rate of real GNP based on chain-weighted GNP in 1992 dollars; and *TOT-US* is the ratio of export prices to import prices. The colored lines represent the one standard error bands.

Sources: U.S. Department of Labor, Bureau of Labor Statistics, and U.S. Department of Commerce, Bureau of Economic Analysis.

FIGURE 7

Impulse response functions in Japan



Notes: *VAC-JP* is the log of the ratio of job offers to total Japanese employment; *UNEMP-JP* is the log of the unemployment rate reported by the Ministry of Labor; *CALL* is the Bank of Japan's call money rate; *DISP-JP* is a measure of sectoral shocks; *GNP-JP* is the growth rate of real GNP based on GNP in 1990 dollars; and *TOT-JP* is the ratio of export prices to import prices. The colored lines represent the one standard error bands.

Sources: Bank of Japan; Tokyo Stock Exchange; and industry employment shares from *Tankan* surveys.

export prices to import prices—the terms of trade (*TOT-JP* and *TOT-US* for Japan and the U.S., respectively). Import prices are a weighted average of fuel and nonfuel import prices, with the weights being equal to the respective shares of these two commodity groups in the total imports of each country.

Empirical results

Figures 6 and 7 show the impulse responses of labor market indicators in Japan and the U.S., respectively, to monetary policy, output, sectoral, and external shocks. The colored lines in the figures are the one standard error bands around the point estimates.[13] Recall that mismatch theories imply that aggregate shocks are associated with negative comovements in unemployment and vacancies, and under most common parameterizations of the economy, sectoral shocks are associated with increases in both unemployment and vacancies.

How do unemployment and vacancies respond when the Federal Reserve and the Bank of Japan pursue tighter monetary policies (innovations in *FFR* and *CALL*)? Both in the U.S. and Japan, unemployment increases and vacancies decline. In the U.S., unemployment starts to rise two quarters out, continues to increase for about a year, then starts to decline. Vacancies in the U.S. respond to monetary policy shocks with similar lagged responses; *VAC-US* starts to decline about two quarters after an innovation in *FFR*, continues to do so for almost two years, then gradually begins to increase. The responses of Japanese labor market indicators to a monetary policy shock are similar to those in the U.S., except their initial responses are more immediate and the estimates are less precise than those in the U.S.

Next, what are the effects of positive innovations in aggregate outputs? In both countries, unemployment decreases and vacancies increase. In Japan, the unemployment rate begins to decline three quarters after the innovation, and vacancies increase about two quarters after the shock. Moreover, the effects of an innovation in *GNP-JP* last for more than a year. In contrast, labor market indicators in the U.S. respond much sooner to an innovation in *GNP-US* (about two quarters after the shock), the effects of the shock dissipate more quickly (within a year), and the estimates are less precise.

The negative comovements of vacancies and unemployment in response to monetary policy and aggregate output shocks are consistent with the implications of the Beveridge curve and models of labor markets based on reallocation costs: Adverse aggregate shocks, such as tighter monetary policy, move the economy down the Beveridge curve to a higher level of unemployment and a lower level of vacancies. Conversely, a favorable aggregate shock, such as an increase in GNP, moves the economy up the Beveridge curve to a lower level of unemployment and a higher level of vacancies.

The responses of Japanese unemployment and vacancies to sectoral shocks are weakly consistent with the predictions of the theory outlined in the previous section. Both unemployment and vacancies increase soon after an innovation in *DISP-JP* (figure 7); however, the impact of the shock on vacancies lasts longer than its impact on unemployment and the responses of both variables are estimated imprecisely. The responses of unemployment and vacancies in the U.S. to sectoral shocks are somewhat less consistent with the predictions of the theory. After an innovation in *DISP-US*, vacancies increase immediately, continue to increase for about a year, then decline (figure 6). On the other hand, the increase in *UNEMP-US* in response to a sectoral shock occurs after a year. Hence, even though there are shifts in the Beveridge curves in both countries, the stock market dispersion index—our measure of sectoral shocks—appears to have limited success in accounting for such shifts. It would be interesting to know if alternative measures of sectoral shocks, such as the one proposed by Rissman (1997) that filters out cyclical fluctuations, would do a better job of explaining shifts in the Beveridge curve.

Finally, consider the effects of innovations in *TOT-US* and *TOT-JP* (an improvement in the terms of trade). In the U.S., vacancies increase and unemployment decreases. The impact of an innovation in *TOT-US* on labor markets occurs immediately and lasts for more than a year. Similarly, the unemployment rate in Japan declines and vacancies increase one year after an improvement in Japanese terms of trade. Furthermore, responses of Japanese labor market indicators to an innovation in the terms of

TABLE 2

Variance decompositions in percent

U.S. unemployment

Quarters	FFR	DISP-US	GNP-US	TOT-US
2	9.77	0.20	1.02	0.09
4	5.81	3.83	0.71	2.02
8	30.40	3.01	0.92	10.73
20	39.22	8.50	0.57	12.29

U.S. vacancies

Quarters	FFR	DISP-US	GNP-US	TOT-US
2	3.81	0.58	0.44	0.11
4	12.64	3.31	1.31	1.46
8	47.88	2.79	1.51	5.06
20	42.98	8.55	0.84	5.02

Japan unemployment

Quarters	CALL	DISP-JP	GNP-JP	TOT-JP
2	3.47	2.12	2.90	2.27
4	8.16	1.21	2.35	2.68
8	11.50	0.93	5.93	2.76
20	13.78	1.86	6.31	18.49

Japan vacancies

Quarters	CALL	DISP-JP	GNP-JP	TOT-JP
2	0.08	0.42	0.92	0.64
4	0.55	1.48	10.59	0.45
8	0.36	3.57	20.40	6.20
20	0.48	5.18	17.28	24.50

Note: For definition of variables, see figures 6 and 7.
Source: U.S. Department of Labor; U.S. Department of Commerce; Bank of Japan; Tokyo Stock Exchange; and industry employment shares from *Tankan* surveys.

trade appear to be greater than the responses of U.S. variables.

Table 2, which shows the variance decompositions of unemployment rates and vacancies for different forecast horizons, provides further evidence on the relative importance of various shocks in Japan and the U.S. Overall, innovations in aggregate output and the terms of trade are more important in explaining long-run labor market fluctuations in Japan than they are in the U.S. Specifically, external shocks account for 18 percent and 24 percent of the fluctuations in Japanese unemployment and vacancies, respectively, in 20-quarter horizons. In contrast, external shocks explain 12 percent of the variations in the U.S. unemployment rate and only 5 percent of the variations in U.S. vacancies over the same forecast horizon.

On the other hand, monetary policy shocks play a more important role in the U.S. than they do in Japan. Innovations in the federal funds rate explain at least 40 percent of the fluctuations in the U.S. labor markets for forecast horizons of more than two years. In contrast, Japanese monetary policy shocks explain at most 14 percent of the fluctuations in the Japanese unemployment rate and less than 1 percent of the fluctuations in Japanese vacancies.[14]

Lastly, sectoral shocks account for up to 5 percent of variations in Japanese labor market indicators and about 8.5 percent of the variations in the U.S. labor market indicators.

With a few exceptions, the results reported here are consistent with those reported in previous studies. For instance, Loungani and Trehan (1997 forthcoming) examine the sources of fluctuations in the U.S. unemployment (including long-duration unemployment), focusing on the relative importance of aggregate and sectoral shocks. The impulse response functions of U.S. unemployment to sectoral and aggregate shocks reported in this article are similar to those reported in Loungani and Trehan, although they attribute a greater fraction of fluctuations in the labor markets to sectoral shocks than we do. Differences in the sample periods and the variables used may account for this difference. For instance, here we consider the dynamics of both unemployment and vacancies, whereas Loungani and Trehan focus on the dynamics of unemployment. Moreover, Brainard and Cutler (1993) find that aggregate shocks play a more significant role in U.S. labor markets than sectoral shocks, similar to our results. Our results with respect to the importance of external shocks in explaining Japanese fluctuations are consistent with those reported in Kaneko and Lee (1995), and West (1992, 1993), but in contrast to those of Brunello (1990b), who reports a significantly smaller impact of real exchange rate changes on Japanese employment compared to the U.S.

Conclusion

In this article, we examine the sources of fluctuations in Japanese and U.S. unemployment rates and vacancies, focusing on sectoral, aggregate output, external, and monetary shocks. Our results are similar to those of previous studies on the U.S. Beveridge curve and provide new evidence on Japanese labor markets.

Throughout our analysis, we sought to provide evidence on the following questions: Despite the differences in the characteristics of Japanese and U.S. labor markets, do unemployment and vacancies in Japan and the U.S. respond to shocks in a similar manner? Are the responses of these labor market indicators to shocks consistent with economic theory? How important are different shocks in explaining the dynamics of the two labor markets?

Our results suggest that despite the differences that may exist between Japanese and U.S. labor markets, unemployment and vacancies in the two countries respond similarly to aggregate disturbances, which move the economies of both countries along their Beveridge curves. Their responses to sectoral and external shocks differ, to some extent. While sectoral shocks shift out the Japanese Beveridge curve, resulting in higher levels of unemployment in the short run, the responses to sectoral shocks from U.S. labor market indicators are less consistent with the predictions of theory.

In addition, there are some differences in the relative importance of various shocks in explaining the movements in the U.S. and Japanese variables. While monetary policy shocks account for a significant fraction of labor market fluctuations in the U.S., they are less important in explaining fluctuations in Japanese labor markets. External and aggregate output shocks account for the greatest fraction of fluctuations in Japan. These results suggest that theories of labor market fluctuations are successful in explaining fluctuations in labor markets with different structures and characteristics.

Our analysis could be extended in a number of ways. One possible avenue is to construct a structural model and estimate VARs based on short-run restrictions. Another avenue is to include additional variables, such as wages and other labor market indicators, to obtain a broader picture of the two labor markets and their dynamics.

NOTES

[1]For instance, see Ahmed, Ickes, Wang and Yoo (1993), Hutchison (1993), Krieger (1989), Moreno (1992), Moreno and Kim (1993), Sims (1992), and West (1992, 1993).

[2]The sectoral shocks as a source of fluctuations in unemployment have been considered by a number of studies, which build on Lilien's (1982) idea that when the movement of resources across industries is costly, an increase in the dispersion of industry-specific shocks can lead to an increase in unemployment by increasing the amount of resources that need to be reallocated across industries. For instance, see Blanchard and Diamond (1989), Brainard and Cutler (1990, 1993), Campbell and Kuttner (1996), Davis and Haltiwanger (1996), Loungani, Rush, and Tave (1990), Rissman (1993, 1997), Samson (1991), Starr–McCluer (1993), and Toledo and Marquis (1993).

[3]For instance, see Blanchard and Diamond (1989) and Davis and Haltiwanger (1996).

[4]To the extent that age is a measure of both a worker's skill level and his/her willingness to invest in human capital to update his/her skills, increased age mismatch would move the Beveridge curve out.

[5]The U.S. and Japanese unemployment rates are surveyed and measured using different techniques; however, the differences in measurement techniques do not account for their differences in behavior. See Sorrentino (1984) and Weiner (1987).

[6]Moreover, many secondary and temporary workers, particularly females, leave the labor force during a recession; this procyclical movement of the labor force is often referred to by Japanese economists as a "discouraged worker effect" or "disguised" unemployment. Brunello (1990a) provides evidence for the greater procyclicality of participation rates in Japan relative to those in three European countries; however these sharp differences are not robust to the inclusion of post-1983 data. Hamada and Kurosaka (1986) estimate a similar regression for Japan only using annual data for 1953 to 1983; while the authors do not test for subsample stability, they do present some evidence that the "discouraged worker effect seems to be declining (p. S286)." Sakurai and Tachibanaki (1991) estimate separate equations for females and male participation rates for the period 1963 to 1986. They find that there was a significant procyclical response of the female participation rate but not of the male participation rate. Tachibanaki (1987) provides a comprehensive discussion of the behavior of labor force participation. Furthermore, average hours per worker fluctuate a lot in Japan over the course of a cycle (Hamada and Kurosaka, 1986; Tachibanaki, 1987; and Weiner, 1987).

[7]Alternatively, we could have used a method suggested by Blanchard and Quah (1989) that identifies shocks by imposing long-run restrictions; however, this method has been criticized by Faust and Leeper (1994) and others for aggregating the multiple shocks that drive business cycles into "aggregate demand" and "aggregate supply" categories that end up being highly correlated with each other

and for lacking robustness in finite samples. Another method, advocated by Bernanke (1986), identifies shocks by using relevant economic theory to place some restrictions on the contemporaneous correlations among the variables in the VAR. We are sympathetic to this approach, and hope to employ it in our future work in this area; however, the restrictions implied by a model with external, aggregate and sectoral shocks have not yet been fully worked out by researchers; see Davis and Haltiwanger (1996) for some steps in this direction.

[8]To determine how sensitive our results are to the specification of the baseline VAR, we also estimated VARs with alternative orderings of the variables. In particular, we estimated systems where *DISP* and *INT* are lower in the ordering than in the baseline specification. The results we obtained, which are not reported here but are available upon request, were qualitatively similar to those reported below. We also estimated the baseline VAR with four lags. The impulse responses in that specification are similar to those shown in figures 7 and 8; however, the relative fractions of forecast error variance that are explained by various shocks seem somewhat sensitive to lag specifications. When the VAR is estimated with four lags, the relative importance of monetary policy shocks in the U.S. declines slightly and the importance of external and aggregate output shocks increases. In Japan, monetary policy and external shocks explain relatively greater fractions of the fluctuations in labor market indicators than they do in the specification reported in this article. However, the general result we report—that while monetary shocks account for greatest fraction of the fluctuations in the U.S. labor markets, external and aggregate output shocks are more important in Japanese labor markets—still holds true.

[9]Previous studies have identified the period after the first oil shock, post-1973, as one of significant structural change in the Japanese economy. To check the sensitivity of results reported in the following section, we also carried out our analysis over the 1975–96 period. The results for the shorter sample period are qualitatively similar to those reported here. (These results are available from the authors upon request.)

[10]For instance, Lilien (1982) uses a dispersion index of sectoral employment–growth rates to identify sector-specific shocks; however, as Abraham and Katz (1986) point out, if sensitivity of sectors to aggregate shocks differs, then aggregate demand, as well as sectoral, shocks would lead to movements in Lilien's dispersion index. For instance, Loungani (1986) shows that a significant fraction of the variation in Lilien's dispersion index is due to differential impact of oil shocks across sectors and that once the movements in the dispersion index due to oil shocks are accounted for, the residual dispersion has no explanatory power for aggregate unemployment. In a more recent study on U.S. unemployment, Loungani and Trehan (1997 forthcoming) show that the response of unemployment to Lilien's dispersion indexes is not robust to the ordering of the index in the VAR. The authors also show that output growth predicts employment dispersion, which in turn is not significant in predicting unemployment or output. In contrast, a dispersion index based on stock returns helps predict output and unemployment, but is not predicted by either of these variables.

[11]In an earlier work on Japanese labor market fluctuations in the 1973–90 period (Genay and Loungani, 1995), we constructed a dispersion index using *excess* stock returns (the residuals from a regression of industry stock returns on a market index and four unobserved common factors) as in Brainard and Cutler (1993). The results reported in this article are similar to those we obtained earlier, suggesting that using a dispersion index of excess returns would not make a material change to the results reported here.

[12]It should be noted that the studies cited employ different estimation methods and analyze different periods. Because the Japanese economy and money markets have undergone major changes since the late 1970s, the different sample periods may partly explain conflicting results. For instance, Moreno and Kim (1993) report that innovations in both money supply and the call money rate are good predictors of fluctuations in Japanese output over the 1960–80 period, but that only innovations in money explain a significant fraction of the output in the 1981–92 period. The authors attribute the different results to changes in the Japanese markets. Furthermore, Shioji (1993) argues that the call money rate or money supply alone is not a good indicator of Bank of Japan policy. By estimating a larger VAR system that takes into account other policy instruments, he finds that the "liquidity" and the "price" puzzles observed by Sims (1992) are no longer evident or are less important in his results.

[13]The standard errors on the impulse response functions are estimated using the Monte Carlo procedure described in the RATS Manual, version 4.2.

[14]Monetary policy shocks also have a much smaller impact on GNP-JP than they do on GNP-US. For 20-quarter forecast horizons, monetary policy shocks explain only 5 percent of the fluctuations in Japanese real GNP, whereas they explain about 21 percent of the forecast error variance in U.S. real GNP. These results are consistent with those reported in Moreno and Kim (1993) and Christiano, Eichenbaum, and Evans (1996). Moreno and Kim report that the call money rate explains about 1 percent of the fluctuations in the two-year ahead forecast error variance in Japanese industrial production and Christiano, Eichenbaum, and Evans report that federal funds policy shocks account for 30 percent of the fluctuations in U.S. real GDP.

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