

Vector Autoregressions

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Macroeconometricians do four things: describe and summarize macroeconomic data, make macroeconomic forecasts, quantify what we do or do not know about the true structure of the macroeconomy, and advise (and sometimes become) macroeconomic policymakers. In the 1970s, these four tasks—data description, forecasting, structural inference and policy analysis—were performed using a variety of techniques. These ranged from large models with hundreds of equations to single-equation models that focused on interactions of a few variables to simple univariate time series models involving only a single variable. But after the macroeconomic chaos of the 1970s, none of these approaches appeared especially trustworthy.

Two decades ago, Christopher Sims (1980) provided a new macroeconomic framework that held great promise: vector autoregressions (VARs). A univariate autoregression is a single-equation, single-variable linear model in which the current value of a variable is explained by its own lagged values. A VAR is an n -equation, n -variable linear model in which each variable is in turn explained by its own lagged values, plus current and past values of the remaining $n - 1$ variables. This simple framework provides a systematic way to capture rich dynamics in multiple time series, and the statistical toolkit that came with VARs was easy to use and to interpret. As Sims (1980) and others argued in a series of influential early papers, VARs held out the promise of providing a coherent and credible approach to data description, forecasting, structural inference and policy analysis.

In this article, we assess how well VARs have addressed these four macroeconomic

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metric tasks.¹ Our answer is “it depends.” In data description and forecasting, VARs have proven to be powerful and reliable tools that are now, rightly, in everyday use. Structural inference and policy analysis are, however, inherently more difficult because they require differentiating between correlation and causation; this is the “identification problem,” in the jargon of econometrics. This problem cannot be solved by a purely statistical tool, even a powerful one like a VAR. Rather, economic theory or institutional knowledge is required to solve the identification (causation versus correlation) problem.

A Peek Inside the VAR Toolkit

What, precisely, is the effect of a 100-basis-point hike in the federal funds interest rate on the rate of inflation one year hence? How big an interest rate cut is needed to offset an expected half percentage point rise in the unemployment rate? How well does the Phillips curve predict inflation? What fraction of the variation in inflation in the past 40 years is due to monetary policy as opposed to external shocks?

Many macroeconomists like to think they know the answers to these and similar questions, perhaps with a modest range of uncertainty. In the next two sections, we take a quantitative look at these and related questions using several three-variable VARs estimated using quarterly U.S. data on the rate of price inflation (π_t), the unemployment rate (u_t) and the interest rate (R_t , specifically, the federal funds rate) from 1960:I–2000:IV.² First, we construct and examine these models as a way to display the VAR toolkit; criticisms are reserved for the next section.

VARs come in three varieties: reduced form, recursive and structural.

A *reduced form VAR* expresses each variable as a linear function of its own past values, the past values of all other variables being considered and a serially uncorrelated error term. Thus, in our example, the VAR involves three equations: current unemployment as a function of past values of unemployment, inflation and the interest rate; inflation as a function of past values of inflation, unemployment and the interest rate; and similarly for the interest rate equation. Each equation is estimated by ordinary least squares regression. The number of lagged values to include in each equation can be determined by a number of different methods, and we will use four lags in our examples.³ The error terms in these regressions are the “surprise” movements in the variables after taking its past values into account. If the different variables are correlated with each other—as they typically are in

¹ Readers interested in more detail than provided in this brief tutorial should see Hamilton’s (1994) textbook or Watson’s (1994) survey article.

² The inflation data are computed as $\pi_t = 400 \ln(P_t/P_{t-1})$, where P_t is the chain-weighted GDP price index and u_t is the civilian unemployment rate. Quarterly data on u_t and R_t are formed by taking quarterly averages of their monthly values.

³ Frequently, the Akaike (AIC) or Bayes (BIC) information criteria are used; for a discussion, see Lütkepohl (1993, chapter 4).

macroeconomic applications—then the error terms in the reduced form model will also be correlated across equations.

A *recursive VAR* constructs the error terms in each regression equation to be uncorrelated with the error in the preceding equations. This is done by judiciously including some contemporaneous values as regressors. Consider a three-variable VAR, ordered as 1) inflation, 2) the unemployment rate, and 3) the interest rate. In the first equation of the corresponding recursive VAR, inflation is the dependent variable, and the regressors are lagged values of all three variables. In the second equation, the unemployment rate is the dependent variable, and the regressors are lags of all three variables *plus* the current value of the inflation rate. The interest rate is the dependent variable in the third equation, and the regressors are lags of all three variables, the current value of the inflation rate *plus* the current value of the unemployment rate. Estimation of each equation by ordinary least squares produces residuals that are uncorrelated across equations.⁴ Evidently, the results depend on the order of the variables: changing the order changes the VAR equations, coefficients, and residuals, and there are $n!$ recursive VARs representing all possible orderings.

A *structural VAR* uses economic theory to sort out the contemporaneous links among the variables (Bernanke, 1986; Blanchard and Watson, 1986; Sims, 1986). Structural VARs require “identifying assumptions” that allow correlations to be interpreted causally. These identifying assumptions can involve the entire VAR, so that all of the causal links in the model are spelled out, or just a single equation, so that only a specific causal link is identified. This produces instrumental variables that permit the contemporaneous links to be estimated using instrumental variables regression. The number of structural VARs is limited only by the inventiveness of the researcher.

In our three-variable example, we consider two related structural VARs. Each incorporates a different assumption that identifies the causal influence of monetary policy on unemployment, inflation and interest rates. The first relies on a version of the “Taylor rule,” in which the Federal Reserve is modeled as setting the interest rate based on past rates of inflation and unemployment.⁵ In this system, the Fed sets the federal funds rate R according to the rule

$$R_t = r^* + 1.5(\bar{\pi}_t - \pi^*) - 1.25(\bar{u}_t - u^*) + \text{lagged values of } R, \pi, u + \varepsilon_t,$$

where r^* is the desired real rate of interest, $\bar{\pi}_t$ and \bar{u}_t are the average values of inflation and unemployment rate over the past four quarters, π^* and u^* are the target values of inflation and unemployment, and ε_t is the error in the equation. This relationship becomes the interest rate equation in the structural VAR.

⁴ In the jargon of VARs, this algorithm for estimating the recursive VAR coefficients is equivalent to estimating the reduced form, then computing the Cholesky factorization of the reduced form VAR covariance matrix; see Lütkepohl (1993, chapter 2).

⁵ Taylor’s (1993) original rule used the output gap instead of the unemployment rate. Our version uses Okun’s Law (with a coefficient of 2.5) to replace the output gap with unemployment rate.

The equation error, ε_t , can be thought of as a monetary policy “shock,” since it represents the extent to which actual interest rates deviate from this Taylor rule. This shock can be estimated by a regression with $R_t - 1.5 \bar{\pi}_t + 1.25 \bar{u}_t$ as the dependent variable, and a constant and lags of interest rates, unemployment and inflation on the right-hand side.

The Taylor rule is “backward looking” in the sense that the Fed reacts to past information ($\bar{\pi}_t$ and \bar{u}_t are averages of the past four quarters of inflation and unemployment), and several researchers have argued that Fed behavior is more appropriately described by forward-looking behavior. Because of this, we consider another variant of the model in which the Fed reacts to forecasts of inflation and unemployment four quarters in the future. This Taylor rule has the same form as the rule above, but with $\bar{\pi}_t$ and \bar{u}_t replaced by four-quarter ahead forecasts computed from the reduced form VAR.

Putting the Three-Variable VAR Through Its Paces

The different versions of the inflation-unemployment-interest rate VAR are put through their paces by applying them to the four macroeconomic tasks. First, the reduced form VAR and a recursive VAR are used to summarize the comovements of these three series. Second, the reduced form VAR is used to forecast the variables, and its performance is assessed against some alternative benchmark models. Third, the two different structural VARs are used to estimate the effect of a policy-induced surprise move in the federal funds interest rate on future rates of inflation and unemployment. Finally, we discuss how the structural VAR could be used for policy analysis.

Data Description

Standard practice in VAR analysis is to report results from Granger-causality tests, impulse responses and forecast error variance decompositions. These statistics are computed automatically (or nearly so) by many econometrics packages (RATS, Eviews, TSP and others). Because of the complicated dynamics in the VAR, these statistics are more informative than are the estimated VAR regression coefficients or R^2 statistics, which typically go unreported.

Granger-causality statistics examine whether lagged values of one variable help to predict another variable. For example, if the unemployment rate does not help predict inflation, then the coefficients on the lags of unemployment will all be zero in the reduced-form inflation equation. Panel A of Table 1 summarizes the Granger-causality results for the three-variable VAR. It shows the p -values associated with the F -statistics for testing whether the relevant sets of coefficients are zero. The unemployment rate helps to predict inflation at the 5 percent significance level (the p -value is 0.02, or 2 percent), but the federal funds interest rate does not (the p -value is 0.27). Inflation does not help to predict the unemployment rate, but the federal funds rate does. Both inflation and the unemployment rates help predict the federal funds interest rate.

Table 1
VAR Descriptive Statistics for (π, u, R)

A. Granger-Causality Tests				
Regressor	Dependent Variable in Regression			
	π	u	R	
π	0.00	0.31	0.00	
u	0.02	0.00	0.00	
R	0.27	0.01	0.00	

B. Variance Decompositions from the Recursive VAR Ordered as π, u, R

B.i. Variance Decomposition of π

Forecast Horizon	Forecast Standard Error	Variance Decomposition (Percentage Points)		
		π	u	R
1	0.96	100	0	0
4	1.34	88	10	2
8	1.75	82	17	1
12	1.97	82	16	2

B.ii. Variance Decomposition of u

Forecast Horizon	Forecast Standard Error	Variance Decomposition (Percentage Points)		
		π	u	R
1	0.23	1	99	0
4	0.64	0	98	2
8	0.79	7	82	11
12	0.92	16	66	18

B.iii. Variance Decomposition of R

Forecast Horizon	Forecast Standard Error	Variance Decomposition (Percentage Points)		
		π	u	R
1	0.85	2	19	79
4	1.84	9	50	41
8	2.44	12	60	28
12	2.63	16	59	25

Notes: π denotes the rate of price inflation, u denotes the unemployment rate and R denotes the Federal Funds interest rate. The entries in Panel A show the p -values for F -tests that lags of the variable in the row labeled *Regressor* do not enter the reduced form equation for the column variable labeled *Dependent Variable*. The results were computed from a VAR with four lags and a constant term over the 1960:I–2000:IV sample period.

Impulse responses trace out the response of current and future values of each of the variables to a one-unit increase in the current value of one of the VAR errors, assuming that this error returns to zero in subsequent periods and that all other errors are equal to zero. The implied thought experiment of changing one error while holding the others constant makes most sense when the errors are uncorrelated across equations, so impulse responses are typically calculated for recursive and structural VARs.

The impulse responses for the recursive VAR, ordered π , u , R , are plotted in Figure 1. The first row shows the effect of an unexpected 1 percentage point increase in inflation on all three variables, as it works through the recursive VAR system with the coefficients estimated from actual data. The second row shows the effect of an unexpected increase of 1 percentage point in the unemployment rate, and the third row shows the corresponding effect for the interest rate. Also plotted are ± 1 standard error bands, which yield an approximate 66 percent confidence interval for each of the impulse responses. These estimated impulse responses show patterns of persistent common variation. For example, an unexpected rise in inflation slowly fades away over 24 quarters and is associated with a persistent increase in unemployment and interest rates.

The *forecast error decomposition* is the percentage of the variance of the error made in forecasting a variable (say, inflation) due to a specific shock (say, the error term in the unemployment equation) at a given horizon (like two years). Thus, the forecast error decomposition is like a partial R^2 for the forecast error, by forecast horizon. These are shown in Panel B of Table 1 for the recursive VAR. They suggest considerable interaction among the variables. For example, at the 12-quarter horizon, 75 percent of the error in the forecast of the federal funds interest rate is attributed to the inflation and unemployment shocks in the recursive VAR.

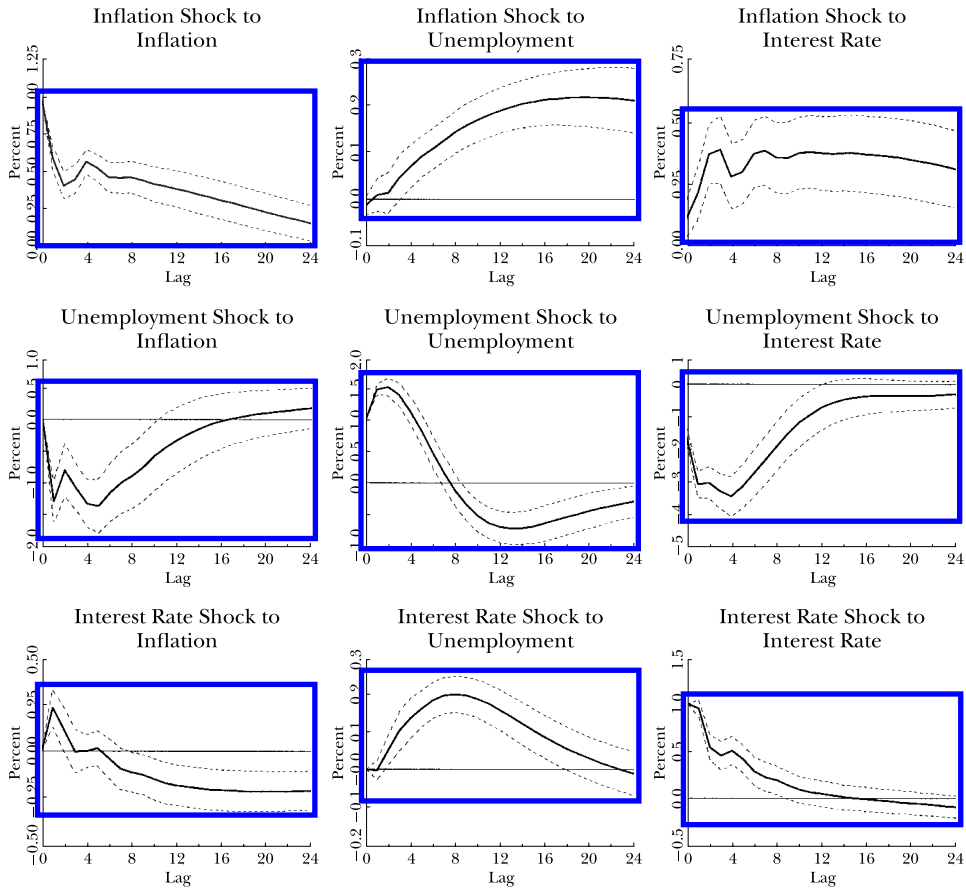
Forecasting

Multistep-ahead forecasts, computed by iterating forward the reduced form VAR, are assessed in Table 2. Because the ultimate test of a forecasting model is its out-of-sample performance, Table 2 focuses on pseudo out-of-sample forecasts over the period from 1985:I to 2000:IV. It examines forecast horizons of two quarters, four quarters and eight quarters. The forecast h steps ahead is computed by estimating the VAR through a given quarter, making the forecast h steps ahead, reestimating the VAR through the next quarter, making the next forecast and so on through the forecast period.⁶

As a comparison, pseudo out-of-sample forecasts were also computed for a univariate autoregression with four lags—that is, a regression of the variable on lags

⁶ Forecasts like these are often referred to as pseudo or “simulated” out-of-sample forecasts to emphasize that they simulate how these forecasts would have been computed in real time, although, of course, this exercise is conducted retrospectively, not in real time. Our experiment deviates slightly from what would have been computed in real time because we use the current data, which includes later revisions made to the inflation and unemployment data by statistical agencies, rather than the data available in real time.

Figure 1

Impulse Responses in the Inflation-Unemployment-Interest Rate Recursive VAR

of its own past values—and for a random walk (or “no change”) forecast. Inflation rate forecasts were made for the average value of inflation over the forecast period, while forecasts for the unemployment rate and interest rate were made for the final quarter of the forecast period. Table 2 shows the root mean square forecast error for each of the forecasting methods. (The mean squared forecast error is computed as the average squared value of the forecast error over the 1985–2000 out-of-sample period, and the resulting square root is the root mean squared forecast error reported in the table.) Table 2 indicates that the VAR either does no worse than or improves upon the univariate autoregression and that both improve upon the random walk forecast.

Structural Inference

What is the effect on the rates of inflation and unemployment of a surprise 100 basis-point increase in the federal funds interest rate? Translated into VAR jargon,

Table 2

Root Mean Squared Errors of Simulated Out-Of-Sample Forecasts, 1985:1–2000:IV

<i>Forecast Horizon</i>	<i>Inflation Rate</i>			<i>Unemployment Rate</i>			<i>Interest Rate</i>		
	<i>RW</i>	<i>AR</i>	<i>VAR</i>	<i>RW</i>	<i>AR</i>	<i>VAR</i>	<i>RW</i>	<i>AR</i>	<i>VAR</i>
2 quarters	0.82	0.70	0.68	0.34	0.28	0.29	0.79	0.77	0.68
4 quarters	0.73	0.65	0.63	0.62	0.52	0.53	1.36	1.25	1.07
8 quarters	0.75	0.75	0.75	1.12	0.95	0.78	2.18	1.92	1.70

Notes: Entries are the root mean squared error of forecasts computed recursively for univariate and vector autoregressions (each with four lags) and a random walk (“no change”) model. Results for the random walk and univariate autoregressions are shown in columns labeled RW and AR, respectively. Each model was estimated using data from 1960:I through the beginning of the forecast period. Forecasts for the inflation rate are for the average value of inflation over the period. Forecasts for the unemployment rate and interest rate are for the final quarter of the forecast period.

this question becomes: What are the impulse responses of the rates of inflation and unemployment to the monetary policy shock in a structural VAR?

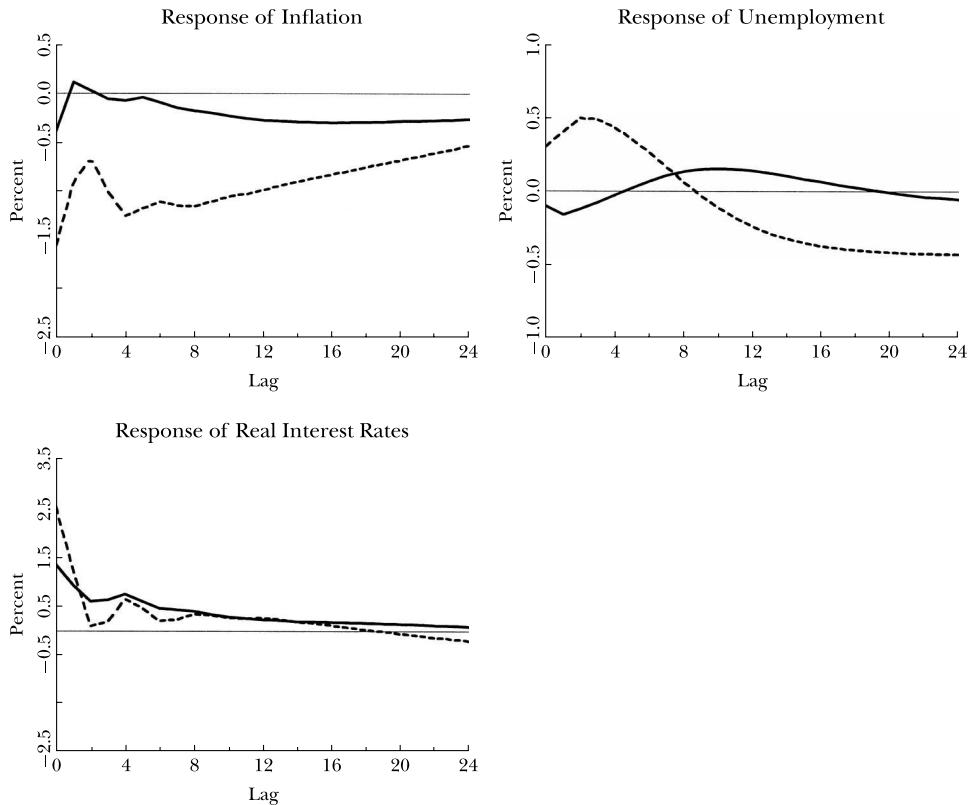
The solid line in Figure 2 plots the impulse responses computed from our model with the backward-looking Taylor rule. It shows the inflation, unemployment and real interest rate ($R_t - \pi_t$) responses to a 1 percentage point shock in the nominal federal funds rate. The initial rate hike results in the real interest rate exceeding 50 basis points for six quarters. Although inflation is eventually reduced by approximately 0.3 percentage points, the lags are long, and most of the action occurs in the third year after the contraction. Similarly, the rate of unemployment rises by approximately 0.2 percentage points, but most of the economic slowdown is in the third year after the rate hike.

How sensitive are these results to the specific identifying assumption used in this structural VAR—that the Fed follows the backward-looking Taylor rule? As it happens, very sensitive. The dashed line in Figure 2 plots the impulse responses computed from the structural VAR with the forward-looking Taylor rule. The impulse responses in real interest rates are broadly similar under either rule. However, in the forward-looking model the monetary shock produces a 0.5 percentage point increase in the unemployment rate within a year, and the rate of inflation drops sharply at first, fluctuates, then leaves a net decline of 0.5 percentage points after six years. Under the backward-looking rule, this 100 basis-point rate hike produces a mild economic slowdown and a modest decline in inflation several years hence; under the forward-looking rule, by this same action the Fed wins a major victory against inflation at the cost of a swift and sharp recession.

Policy Analysis

In principle, our small structural VAR can be used to analyze two types of policies: surprise monetary policy interventions and changing the policy rule, like shifting from a Taylor rule (with weight on both unemployment and inflation) to an explicit inflation targeting rule.

Figure 2

Impulse Responses of Monetary Policy Shocks for Different Taylor Rule Identifying Assumptions

Notes: The solid line is computed with the backward-looking Taylor rule; the dashed line, with the forward-looking Taylor rule.

If the intervention is an unexpected movement in the federal funds interest rate, then the estimated effect of this policy on future rates of inflation and unemployment is summarized by the impulse response functions plotted in Figure 2. This might seem a somewhat odd policy, but the same mechanics can be used to evaluate a more realistic intervention, such as raising the federal funds rate by 50 basis points and sustaining this increase for one year. This policy can be engineered in a VAR by using the right sequence of monetary policy innovations to hold the federal funds interest rate at this sustained level for four quarters, taking into account that in the VAR, actions on interest rates in earlier quarters affect those in later quarters (Sims, 1982; Waggoner and Zha, 1999).

Analysis of the second type of policy—a shift in the monetary rule itself—is more complicated. One way to evaluate a new policy rule candidate is to ask what would be the effect of monetary and nonmonetary shocks on the economy under the new rule. Since this question involves all the structural disturbances, answering

it requires a complete macroeconomic model of the simultaneous determination of all the variables, and this means that all of the causal links in the structural VAR must be specified. In this case, policy analysis is carried out as follows: a structural VAR is estimated in which all the equations are identified, then a new model is formed by replacing the monetary policy rule. Comparing the impulse responses in the two models shows how the change in policy has altered the effects of monetary and nonmonetary shocks on the variables in the model.

How Well Do VARs Perform the Four Tasks?

We now turn to an assessment of VARs in performing the four macroeconomic tasks, highlighting both successes and shortcomings.

Data Description

Because VARs involve current and lagged values of multiple time series, they capture comovements that cannot be detected in univariate or bivariate models. Standard VAR summary statistics like Granger-causality tests, impulse response functions and variance decompositions are well-accepted and widely used methods for portraying these comovements. These summary statistics are useful because they provide targets for theoretical macroeconomic models. For example, a theoretical model that implied that interest rates should Granger-cause inflation but unemployment should not would be inconsistent with the evidence in Table 1.

Of course, the VAR methods outlined here have some limitations. One is that the standard methods of statistical inference (such as computing standard errors for impulse responses) may give misleading results if some of the variables are highly persistent.⁷ Another limitation is that, without modification, standard VARs miss nonlinearities, conditional heteroskedasticity and drifts or breaks in parameters.

Forecasting

Small VARs like our three-variable system have become a benchmark against which new forecasting systems are judged. But while useful as a benchmark, small VARs of two or three variables are often unstable and thus poor predictors of the future (Stock and Watson, 1996).

State-of-the-art VAR forecasting systems contain more than three variables and allow for time-varying parameters to capture important drifts in coefficients (Sims, 1993). However, adding variables to the VAR creates complications, because the number of VAR parameters increases as the square of the number of variables: a nine-variable, four-lag VAR has 333 unknown coefficients (including the inter-

⁷ Bootstrap methods provide some improvements (Kilian, 1999) for inference about impulse responses, but treatments of this problem that are fully satisfactory theoretically are elusive (Stock, 1997; Wright, 2000).

cepts). Unfortunately, macroeconomic time series data cannot provide reliable estimates of all these coefficients without further restrictions.

One way to control the number of parameters in large VAR models is to impose a common structure on the coefficients, for example using Bayesian methods, an approach pioneered by Litterman (1986) (six variables) and Sims (1993) (nine variables). These efforts have paid off, and these forecasting systems have solid real-time track records (McNees, 1990; Zarnowitz and Braun, 1993).

Structural Inference

In our three-variable VAR in the previous section, the estimated effects of a monetary policy shock on the rates of inflation and unemployment (summarized by the impulse responses in Figure 2) depend on the details of the presumed monetary policy rule followed by the Federal Reserve. Even modest changes in the assumed rule resulted in substantial changes in these impulse responses. In other words, the estimates of the structural impulse responses hinge on detailed institutional knowledge of how the Fed sets interest rates.⁸

Of course, the observation that results depend on assumptions is hardly new. The operative question is whether the assumptions made in VAR models are any more compelling than in other econometric models. This is a matter of heated debate and is thoughtfully discussed by Leeper, Sims and Zha (1996), Christiano, Eichenbaum and Evans (1999), Cochrane (1998), Rudebusch (1998) and Sims (1998). Below are three important criticisms of structural VAR modeling.⁹

First, what really makes up the VAR “shocks?” In large part, these shocks, like those in conventional regression, reflect factors omitted from the model. If these factors are correlated with the included variables, then the VAR estimates will contain omitted variable bias. For example, officials at the Federal Reserve might scoff at the idea that they mechanically followed a Taylor rule, or any other fixed-coefficient mechanical rule involving only a few variables; rather, they suggest that their decisions are based on a subtle analysis of very many macroeconomic factors, both quantitative and qualitative. These considerations, when omitted from the VAR, end up in the error term and (incorrectly) become part of the estimated historical “shock” used to estimate an impulse response. A concrete example of this in the VAR literature involves the “price puzzle.” Early VARs showed an odd result: inflation tended to increase following monetary policy tightening. One explanation for this (Sims, 1992) was that the Fed was looking forward when it set interest rates and that simple VARs omitted variables that could be used to predict future inflation. When these omitted variables intimated an increase in inflation, the Fed tended to increase interest rates. Thus, these VAR interest rate shocks presaged

⁸ In addition, the institutional knowledge embodied in our three-variable VAR is rather naïve; for example, the Taylor rule was designed to summarize policy in the Greenspan era, not the full sample in our paper.

⁹ This list hits only the highlights; other issues include the problem of “weak instruments” discussed in Pagan and Robertson (1998) and the problem of noninvertible representations discussed in Hansen and Sargent (1991) and Lippi and Reichlin (1993).

increases in inflation. Because of omitted variables, the VAR mistakenly labeled these increases in interest rates as monetary shocks, which led to biased impulse responses. Indeed, Sims's explanation of the price puzzle has led to the practice of including commodity prices in VARs to attempt to control for predicted future inflation.

Second, policy rules change over time, and formal statistical tests reveal widespread instability in low-dimensional VARs (Stock and Watson, 1996). Constant parameter structural VARs that miss this instability are improperly identified. For example, several researchers have documented instability in monetary policy rules (for example, Bernanke and Blinder, 1992; Bernanke and Mihov, 1998; Clarida, Gali and Gertler, 2000; Boivin, 2000), and this suggests misspecification in constant coefficient VAR models (like our three-variable example) that are estimated over long sample periods.

Third, the timing conventions in VARs do not necessarily reflect real-time data availability, and this undercuts the common method of identifying restrictions based on timing assumptions. For example, a common assumption made in structural VARs is that variables like output and inflation are sticky and do not respond "within the period" to monetary policy shocks. This seems plausible over the period of a single day, but becomes less plausible over a month or quarter.

In this discussion, we have carefully distinguished between recursive and structural VARs: recursive VARs use an arbitrary mechanical method to model contemporaneous correlation in the variables, while structural VARs use economic theory to associate these correlations with causal relationships. Unfortunately, in the empirical literature the distinction is often murky. It is tempting to develop economic "theories" that, conveniently, lead to a particular recursive ordering of the variables, so that their "structural" VAR simplifies to a recursive VAR, a structure called a "Wold causal chain." We think researchers yield to this temptation far too often. Such cobbled-together theories, even if superficially plausible, often fall apart on deeper inspection. Rarely does it add value to repackaging a recursive VAR and sell it as structural.

Despite these criticisms, we think it is possible to have credible identifying assumptions in a VAR. One approach is to exploit detailed institutional knowledge. An example of this is the study by Blanchard and Perotti (1999) of the macroeconomic effects of fiscal policy. They argue that the tax code and spending rules impose tight constraints on the way that taxes and spending vary within the quarter, and they use these constraints to identify the exogenous changes in taxes and spending necessary for causal analysis. Another example is Bernanke and Mihov (1998), who use a model of the reserves market to identify monetary policy shocks. A different approach to identification is to use long-run restrictions to identify shocks; for example, King, Plosser, Stock and Watson (1991) use the long-run neutrality of money to identify monetary shocks. However, assumptions based on the infinite future raise questions of their own (Faust and Leeper, 1997).

A constructive approach is to recognize explicitly the uncertainty in the assumptions that underlie structural VAR analysis and see what inferences, or range of inferences, still can be made. For example, Faust (1998) and Uhlig (1999)

discuss inference methods that can be applied using only inequality restrictions on the theoretical impulse responses (for example, monetary contractions do not cause booms).

Policy Analysis

Two types of policies can be analyzed using a VAR: one-off innovations, in which the same rule is maintained; and changes in the policy rule. The estimated effect of one-off innovations is a function of the impulse responses to a policy innovation, and potential pitfalls associated with these have already been discussed.

Things are more difficult if one wants to estimate the effect of changing policy rules. If the true structural equations involve expectations (say, an expectational Phillips curve), then the expectations will depend on the policy rule; thus, in general, all the VAR coefficients will depend on the rule. This is just a version of the Lucas (1976) critique. The practical importance of the Lucas critique for this type of VAR policy analysis is a matter of debate.

After Twenty Years of VARs

VARs are powerful tools for describing data and for generating reliable multivariate benchmark forecasts. Technical work remains, most notably extending VARs to higher dimensions and richer nonlinear structures. Even without these important extensions, however, VARs have made lasting contributions to the macroeconometrician's toolkit for tackling these two tasks.

Whether 20 years of VARs have produced lasting contributions to structural inference and policy analysis is more debatable. Structural VARs can capture rich dynamic properties of multiple time series, but their structural implications are only as sound as their identification schemes. While there are some examples of thoughtful treatments of identification in VARs, far too often in the VAR literature the central issue of identification is handled by ignoring it. In some fields of economics, such as labor economics and public finance, identification can be obtained credibly using natural experiments that permit some exogenous variation to be teased out of a relationship otherwise fraught with endogeneity and omitted variables bias. Unfortunately, these kinds of natural experiments are rare in macroeconomics.

Although VARs have limitations when it comes to structural inference and policy analysis, so do the alternatives. Calibrated dynamic stochastic general equilibrium macroeconomic models are explicit about causal links and expectations and provide an intellectually coherent framework for policy analysis. But the current generation of these models do not fit the data well. At the other extreme, simple single-equation models, for example, regressions of inflation against lagged interest rates, are easy to estimate and sometimes can produce good forecasts. But if it is difficult to distinguish correlation and causality in a VAR, it is even more so in single-equation models, which can, in any event, be viewed as one equation pulled from a larger VAR. Used wisely and based on economic reasoning and

institutional detail, VARs both can fit the data and, at their best, can provide sensible estimates of some causal connections. Developing and melding good theory and institutional detail with flexible statistical methods like VARs should keep macroeconomists busy well into the new century.

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References

- Bernanke, Ben S.** 1986. "Alternative Explanations of the Money-Income Correlation." *Carnegie-Rochester Conference Series on Public Policy*. Autumn, 25, pp. 49–99.
- Bernanke, Ben S. and Alan Blinder.** 1992. "The Federal Funds Rate and the Channels of Monetary Transmission." *American Economic Review*. September, 82:4, pp. 901–21.
- Bernanke, Ben S. and Ilhan Mihov.** 1998. "Measuring Monetary Policy." *Quarterly Journal of Economics*. August, 113:3, pp. 869–902.
- Blanchard, Olivier J. and Roberto Perotti.** 1999. "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output." NBER Working Paper No. 2769, July.
- Blanchard, Olivier J. and Mark W. Watson.** 1986. "Are Business Cycles All Alike?" in *The American Business Cycle: Continuity and Change*. R.J. Gordon, ed. Chicago: University of Chicago Press, pp. 123–56.
- Boivin, Jean.** 2000. "The Fed's Conduct of Monetary Policy: Has it Changed and Does it Matter?" Manuscript, Columbia University, December.
- Christiano, Lawrence J., Martin Eichenbaum and Charles L. Evans.** 1997. "Sticky Price and Limited Participation Models: A Comparison." *European Economic Review*. June, 41:6, pp. 1201–49.
- Christiano, Lawrence J., Martin Eichenbaum and Charles L. Evans.** 1999. "Monetary Policy Shocks: What Have We Learned and To What End?" in *Handbook of Macroeconomics, Volume 1A*. John B. Taylor and Michael Woodford, eds. Amsterdam: Elsevier Science Ltd., pp. 65–148.
- Clarida, Richard, Jordi Gali and Mark Gertler.** 1999. "The Science of Monetary Policy: A New Keynesian Perspective." *Journal of Economic Literature*. December, 37:4, pp. 1661–707.
- Clarida, Richard, Jordi Gali and Mark Gertler.** 2000. "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory." *Quarterly Journal of Economics*. February, 115:1, pp. 147–80.
- Cochrane, John H.** 1998. "What Do the VARs Mean?: Measuring the Output Effects of Monetary Policy." *Journal of Monetary Economics*. 41:2, pp. 277–300.
- Faust, Jon.** 1998. "The Robustness of Identified VAR Conclusions About Money." *Carnegie-Rochester Conference Series on Public Policy*. December, 49, pp. 207–44.
- Faust, Jon and Eric M. Leeper.** 1997. "When Do Long-Run Identifying Restrictions Give Reliable Results?" *Journal of Business and Economic Statistics*. July, 15:3, pp. 345–53.
- Granger, Clive W.J. and Paul Newbold.** 1977. *Forecasting Economic Time Series, First Edition*. New York: Academic Press.
- Hamilton, James D.** 1994. *Time Series Analysis*. Princeton, N.J.: Princeton University Press.
- Hansen, Lars P. and Thomas J. Sargent.** 1991. "Two Problems in Interpreting Vector Autoregressions," in *Rational Expectations Econometrics*. Lars P. Hansen and Thomas J. Sargent, eds. Boulder: Westview, pp. 77–119.
- Kilian, Lutz.** 1999. "Finite-Sample Properties of Percentile and Percentile-*t* Bootstrap Confidence Intervals for Impulse Responses." *Review of Economics and Statistics*. November, 81:4, pp. 652–60.
- King, Robert G. et al.** 1991. "Stochastic Trends

- and Economic Fluctuations." *American Economic Review*. 81:4, pp. 819–40.
- Leeper, Eric M., Christopher A. Sims and Tao Zha.** 1996. "What Does Monetary Policy Do?" *Brookings Papers on Economic Activity*. 2, pp. 1–63.
- Lippi, Marco and Lucrezia Reichlin.** 1993. "The Dynamic Effects of Supply and Demand Disturbances: Comment." *American Economic Review*. June, 83:3, pp. 644–52.
- Litterman, Robert B.** 1986. "Forecasting With Bayesian Vector Autoregressions: Five Years of Experience." *Journal of Business and Economic Statistics*. January, 4:1, pp. 25–38.
- Lucas, Robert E., Jr.** 1976. "Economic Policy Evaluation: A Critique." *Journal of Monetary Economics*. 1:2, pp. 19–46.
- Lütkepohl, Helmut.** 1993. *Introduction to Multiple Time Series Analysis, Second Edition*. Berlin: Springer-Verlag.
- McNees, Stephen K.** 1990. "The Role of Judgment in Macroeconomic Forecasting Accuracy." *International Journal of Forecasting*. October, 6:3, pp. 287–99.
- Pagan, Adrian R. and John C. Robertson.** 1998. "Structural Models of the Liquidity Effect." *Review of Economics and Statistics*. May, 80:2, pp. 202–17.
- Rudebusch, Glenn D.** 1998. "Do Measures of Monetary Policy in a VAR Make Sense?" *International Economic Review*. November, 39:4, pp. 907–31.
- Sims, Christopher A.** 1980. "Macroeconomics and Reality." *Econometrica*. January, 48:1, pp. 1–48.
- Sims, Christopher A.** 1982. "Policy Analysis With Econometric Models." *Brookings Papers on Economic Activity*. 1, pp. 107–52.
- Sims, Christopher A.** 1986. "Are Forecasting Models Usable for Policy Analysis?" *Federal Reserve Bank of Minneapolis Quarterly Review*. Winter, 10:1, pp. 2–16.
- Sims, Christopher A.** 1992. "Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy." *European Economic Review*. June, 36:5, pp. 975–1011.
- Sims, Christopher A.** 1993. "A Nine Variable Probabilistic Macroeconomic Forecasting Model," in *NBER Studies in Business: Business Cycles, Indicators, and Forecasting, Volume 28*. James H. Stock and Mark W. Watson, eds. Chicago: University of Chicago Press, pp. 11–94.
- H. Stock and Mark W. Watson,** eds. Chicago: University of Chicago Press, pp. 179–214.
- Sims, Christopher A.** 1998. "Comment on Glenn Rudebusch's 'Do Measures of Monetary Policy in a VAR Make Sense?' (with reply)." *International Economic Review*. November, 39:4, pp. 933–48.
- Sims, Christopher A. and Tao Zha.** 1995. "Does Monetary Policy Generate Recessions?" Manuscript, Federal Reserve Bank of Atlanta.
- Stock, James H.** 1997. "Cointegration, Long-Run Comovements, and Long-Horizon Forecasting," in *Advances in Econometrics: Proceedings of the Seventh World Congress of the Econometric Society, Volume III*. David Kreps and Kenneth F. Wallis, eds. Cambridge: Cambridge University Press, pp. 34–60.
- Stock, James H. and Mark W. Watson.** 1996. "Evidence on Structural Instability in Macroeconomic Time Series Relations." *Journal of Business and Economic Statistics*. January, 14:1, pp. 11–30.
- Taylor, John B.** 1993. "Discretion Versus Policy Rules in Practice." *Carnegie-Rochester Conference Series on Public Policy*. December, 39, pp. 195–214.
- Uhlig, Harald.** 1999. "What are the Effects of Monetary Policy on Output? Results from an Agnostic Identification Procedure." Manuscript, CentER, Tilburg University.
- Waggoner, Daniel F. and Tao Zha.** 1999. "Conditional Forecasts in Dynamic Multivariate Models." *Review of Economics and Statistics*. November, 81:4, pp. 639–51.
- Watson, Mark W.** 1994. "Vector Autoregressions and Cointegration," in *Handbook of Econometrics, Volume IV*. Robert Engle and Daniel McFadden, eds. Amsterdam: Elsevier Science Ltd., pp. 2844–915.
- Wright, Jonathan H.** 2000. "Confidence Intervals for Univariate Impulse Responses with a Near Unit Root." *Journal of Business and Economic Statistics*. July, 18:3, pp. 368–73.
- Zarnowitz, Victor and Phillip Braun.** 1993. "Twenty-Two Years of the NBER-ASA Quarterly Economic Outlook Surveys: Aspects and Comparisons of Forecasting Performance," in *NBER Studies in Business Cycles: Business Cycles, Indicators, and Forecasting, Volume 28*. James H. Stock and Mark W. Watson, eds. Chicago: University of Chicago Press, pp. 11–94.

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1. Enn Lun Yong. 2019. Unemployment and the European Union, 2000–2017: structural exploration of distant past economic experience and future prosperity. *Journal of Economic Structures* **8**:1. . [[Crossref](#)]
2. Noha H.A. Razek, Nyakundi M. Michieka. 2019. OPEC and non-OPEC production, global demand, and the financialization of oil. *Research in International Business and Finance* **50**, 201-225. [[Crossref](#)]
3. Goran Petrevski, Borce Trenovski, Biljana Tashevska. 2019. The effectiveness of fiscal and monetary policies in a small open economy – the case of Macedonia. *Post-Communist Economies* **31**:6, 805-821. [[Crossref](#)]
4. Paul Beaudry, Patrick Fève, Alain Guay, Franck Portier. 2019. When is nonfundamentalness in SVARs a real problem?. *Review of Economic Dynamics* **34**, 221-243. [[Crossref](#)]
5. Shiu-Sheng Chen, Tzu-Yu Lin. 2019. Do Exchange Rate Shocks Have Asymmetric Effects on Reserve Accumulation? Evidence from Emerging Markets. *The Scandinavian Journal of Economics* **121**:4, 1561-1586. [[Crossref](#)]
6. Thi Mai Lan Nguyen, Elissaios Papyrakis, Peter A.G Van Bergeijk. 2019. Assessing the price and output effects of monetary policy in Vietnam: evidence from a VAR analysis. *Applied Economics* **51**:44, 4800-4819. [[Crossref](#)]
7. Manel Youssef, Khaled Mokni. 2019. Do Crude Oil Prices Drive the Relationship between Stock Markets of Oil-Importing and Oil-Exporting Countries?. *Economies* **7**:3, 70. [[Crossref](#)]
8. Chiachi Bonnie Lee, Chen-Mao Liao, Li-Hsin Peng, Chih-Ming Lin. 2019. Economic fluctuations and cardiovascular diseases: A multiple-input time series analysis. *PLOS ONE* **14**:8, e0219358. [[Crossref](#)]
9. Yoshimasa Uematsu, Yingying Fan, Kun Chen, Jinchi Lv, Wei Lin. 2019. SOFAR: Large-Scale Association Network Learning. *IEEE Transactions on Information Theory* **65**:8, 4924-4939. [[Crossref](#)]
10. Vinodh Madhavan, Partha Ray. 2019. Price and Volatility Linkages Between Indian Stocks and Their European GDRs. *Journal of Emerging Market Finance* **18**:2_suppl, S213-S237. [[Crossref](#)]
11. Ngoc Nguyen, Charles Harvie, Sandy Suardi. 2019. ASEAN income gap and the optimal exchange Rate Regime. *Applied Economics* **61**, 1-17. [[Crossref](#)]
12. Ikhlās Gurrib. 2019. Can energy commodities affect energy blockchain-based cryptos?. *Studies in Economics and Finance* **ahead-of-print**:ahead-of-print. . [[Crossref](#)]
13. Gianluca Cafiso. 2019. GDP Growth through Private Debt: The Effect of Monetary Shocks. *CESifo Economic Studies* **65**:2, 236-253. [[Crossref](#)]
14. Chieh-Hsuan Wang, Chien-Ping Chung, Jen-Te Hwang. 2019. The impact of minimum wages and foreign domestic workers in Taiwan. *Australian Economic Papers* **58**:2, 168-193. [[Crossref](#)]
15. Alex Coad, Nicola Grassano. 2019. Firm growth and R&D investment: SVAR evidence from the world's top R&D investors. *Industry and Innovation* **26**:5, 508-533. [[Crossref](#)]
16. William B. Hankins, Anna-Leigh Stone, Chak Hung Jack Cheng, Ching-Wai (Jeremy) Chiu. 2019. Corporate decision making in the presence of political uncertainty: The case of corporate cash holdings. *Financial Review* **68**. . [[Crossref](#)]
17. Michael J. Zyphur, Paul D. Allison, Louis Tay, Manuel C. Voelkle, Kristopher J. Preacher, Zhen Zhang, Ellen L. Hamaker, Ali Shamsollahi, Dean C. Pierides, Peter Koval, Ed Diener. 2019. From Data to Causes I: Building A General Cross-Lagged Panel Model (GCLM). *Organizational Research Methods* **175**, 109442811984727. [[Crossref](#)]
18. Ezebuilo R. Ukwueze, Henry T. Asogwa, Oliver E. Ogbonna, Chisom Emecheta. The Determinants of Terrorism in Nigeria 191-203. [[Crossref](#)]

19. Mohammad Reza Farzanegan, Tim Krieger. 2019. Oil booms and inequality in Iran. *Review of Development Economics* **23**:2, 830-859. [[Crossref](#)]
20. Beste H. Beyaztas. 2019. Construction of multi-step forecast regions of VAR processes using ordered block bootstrap. *Communications in Statistics - Simulation and Computation* **80**, 1-19. [[Crossref](#)]
21. Chang-Jin Kim, Yunmi Kim. 2019. A unified framework jointly explaining business conditions, stock returns, volatility and “volatility feedback news” effects. *Studies in Nonlinear Dynamics & Econometrics* **23**:2. . [[Crossref](#)]
22. LEO KRIPPNER. 2019. A Note of Caution on Shadow Rate Estimates. *Journal of Money, Credit and Banking* **50**. . [[Crossref](#)]
23. Rijamampianina Rasoava. 2019. Executive compensation and firm performance: a non-linear relationship. *Problems and Perspectives in Management* **17**:2, 1-17. [[Crossref](#)]
24. Wen Cheong Chin, Min Cherng Lee. 2019. Nonlinear high-frequency stock market time series: Modeling and combine forecast evaluations. *Communications in Statistics - Simulation and Computation* 1-19. [[Crossref](#)]
25. Nuttanan Wichitaksorn. 2019. Analyzing multiple vector autoregressions through matrix-variate normal distribution with two covariance matrices. *Communications in Statistics - Theory and Methods* **5**, 1-13. [[Crossref](#)]
26. Ryan Greenaway-McGrevy, Kyle Hood. 2019. Aggregate effects and measuring regional dynamics. *Papers in Regional Science* . [[Crossref](#)]
27. Boris Salazar, Daniel Otero. 2019. A Tale of a Tool. *History of Political Economy* 557-578. [[Crossref](#)]
28. ÖZGE DEMİRKALE. 2019. Emeklilik Fonları İle Makroekonomik Faktörlerin Karşılıklı Etkileşiminin Türkiye ve Seçilmiş Ülkelerle Analizi. *Ekonomi, Politika & Finans Araştırmaları Dergisi* 121-138. [[Crossref](#)]
29. Fumio Hayashi. 2019. Peril of the Inflation Exit Condition. *The Japanese Economic Review* **70**:1, 4-27. [[Crossref](#)]
30. Nate Breznau, Carola Hommerich. 2019. No generalizable effect of income inequality on public support for governmental redistribution among rich democracies 1987–2010. *Social Science Research* . [[Crossref](#)]
31. Hippolyte d’Albis, Ekrame Boubtane, Dramane Coulibaly. 2019. Immigration and public finances in OECD countries. *Journal of Economic Dynamics and Control* **99**, 116-151. [[Crossref](#)]
32. Gordon C.R. Kemp, Paulo M.D.C. Parente, J.M.C. Santos Silva. 2019. Dynamic Vector Mode Regression. *Journal of Business & Economic Statistics* 1-27. [[Crossref](#)]
33. Mohammed Amidu, William Coffie, Philomina Acquah. 2019. Transfer pricing, earnings management and tax avoidance of firms in Ghana. *Journal of Financial Crime* **26**:1, 235-259. [[Crossref](#)]
34. David Hillier, Tiago Loncan. 2019. Stock market integration, cost of equity capital, and corporate investment: Evidence from Brazil. *European Financial Management* **25**:1, 181-206. [[Crossref](#)]
35. Yonghong Jiang, Cheng Jiang, He Nie, Bin Mo. 2019. The time-varying linkages between global oil market and China's commodity sectors: Evidence from DCC-GJR-GARCH analyses. *Energy* **166**, 577-586. [[Crossref](#)]
36. Leo Krippner. 2019. Will the Real Eigensystem VAR Please Stand Up? A Univariate Primer. *SSRN Electronic Journal* . [[Crossref](#)]
37. Fumio Hayashi, Junko Koeda. 2019. Exiting from quantitative easing. *Quantitative Economics* **10**:3, 1069-1107. [[Crossref](#)]

38. Alper Ozcan, Sule Gunduz Oguducu. 2019. Multivariate Time Series Link Prediction for Evolving Heterogeneous Network. *International Journal of Information Technology & Decision Making* **18**:01, 241-286. [[Crossref](#)]
39. Peter Andre, Carlo Pizzinelli, Christopher Roth, Johannes Wohlfart. 2019. Subjective Models of the Macroeconomy: Evidence from Experts and a Representative Sample. *SSRN Electronic Journal* . [[Crossref](#)]
40. F. Kuchler, M. Bowman, M. Sweitzer, C. Greene. 2018. Evidence from Retail Food Markets That Consumers Are Confused by Natural and Organic Food Labels. *Journal of Consumer Policy* **27**. . [[Crossref](#)]
41. Denghui Chen. 2018. Risk aversion decomposition and the impact of monetary policy surprises on aggregate tail risk aversion. *The Journal of Risk Finance* **19**:5, 564-590. [[Crossref](#)]
42. Jefferson A. Colombo, Tiago R. Loncan, João F. Caldeira. 2018. Do foreign portfolio capital flows affect domestic investment? Evidence from Brazil. *International Journal of Finance & Economics* **32**. . [[Crossref](#)]
43. Young Bong Chang, YoungOk Kwon. 2018. Ambiguities in valuing information technology firms: Do internet searches help?. *Journal of Business Research* **92**, 260-269. [[Crossref](#)]
44. Christos I. Papanagnou, Omeiza Matthews-Amune. 2018. Coping with demand volatility in retail pharmacies with the aid of big data exploration. *Computers & Operations Research* **98**, 343-354. [[Crossref](#)]
45. Songcui Hu, Richard A. Bettis. 2018. Multiple Organization Goals with Feedback from Shared Technological Task Environments. *Organization Science* **29**:5, 873-889. [[Crossref](#)]
46. Kingsley E. Dogah, Gamini Premaratne. 2018. Sectoral exposure of financial markets to oil risk factors in BRICS countries. *Energy Economics* **76**, 228-256. [[Crossref](#)]
47. Stefan Bruder, Michael Wolf. 2018. Balanced Bootstrap Joint Confidence Bands for Structural Impulse Response Functions. *Journal of Time Series Analysis* **39**:5, 641-664. [[Crossref](#)]
48. Anna Cieslak. 2018. Short-Rate Expectations and Unexpected Returns in Treasury Bonds. *The Review of Financial Studies* **31**:9, 3265-3306. [[Crossref](#)]
49. K A G Wyckhuys, W Zhang, S D Prager, D B Kramer, E Delaquis, C E Gonzalez, W van der Werf. 2018. Biological control of an invasive pest eases pressures on global commodity markets. *Environmental Research Letters* **13**:9, 094005. [[Crossref](#)]
50. Victor R. Krashenninnikov, Vladimir N. Klyachkin, Yulia E. Kuvayskova. Models Updating for Technical Objects State Forecasting 1-4. [[Crossref](#)]
51. Gopal K. Basak, Arnab Bhattacharjee, Samarjit Das. 2018. Causal ordering and inference on acyclic networks. *Empirical Economics* **55**:1, 213-232. [[Crossref](#)]
52. Sajjad Faraji Dizaji. 2018. Trade openness, political institutions, and military spending (evidence from lifting Iran's sanctions). *Empirical Economics* **2**. . [[Crossref](#)]
53. Tianqiong Wang, Joshua Sunday Riti, Yang Shu. 2018. Decoupling emissions of greenhouse gas, urbanization, energy and income: analysis from the economy of China. *Environmental Science and Pollution Research* **25**:20, 19845-19858. [[Crossref](#)]
54. Hippolyte d'Albis, Ekrame Boubtane, Dramane Coulibaly. 2018. Macroeconomic evidence suggests that asylum seekers are not a "burden" for Western European countries. *Science Advances* **4**:6, eaaq0883. [[Crossref](#)]
55. Kim Abildgren, Niels Lynggård Hansen, Andreas Kuchler. 2018. Overoptimism and house price bubbles. *Journal of Macroeconomics* **56**, 1-14. [[Crossref](#)]
56. Juan Pablo Medina. 2018. Mining development and macroeconomic spillovers in Chile. *Resources Policy* . [[Crossref](#)]

57. Vo The Anh, Le Thai Thuong Quan, Nguyen Van Phuc, Ho Minh Chi, Vo Hong Duc. 2018. Exchange Rate Pass-Through in ASEAN Countries: An Application of the SVAR Model. *Emerging Markets Finance and Trade* **21**, 1-14. [[Crossref](#)]
58. Ethem Çanakoglu, Esra Adıyeke, Semra Ağralı. 2018. Modeling of carbon credit prices using regime switching approach. *Journal of Renewable and Sustainable Energy* **10**:3, 035901. [[Crossref](#)]
59. Maria Kalli, Jim E. Griffin. 2018. Bayesian nonparametric vector autoregressive models. *Journal of Econometrics* **203**:2, 267-282. [[Crossref](#)]
60. Imran H. Shah, Ian Corrick, Abdul Saboor. 2018. How should Central Banks Respond to Non-neutral Inflation Expectations?. *Open Economies Review* **29**:2, 321-351. [[Crossref](#)]
61. Jin Park, Dong Lee, Jianbang Gan, Chan Park, Songyi Kim, Sunyong Sung, Tae Jung, Sung Hong. 2018. Effects of Climate Change and Ozone Concentration on the Net Primary Productivity of Forests in South Korea. *Forests* **9**:3, 112. [[Crossref](#)]
62. Jonathan E Butner, Cynthia A Berg, A K Munion, Sara L Turner, Amy Hughes-Lansing, Joel B Winnick, Deborah J Wiebe. 2018. Coordination of Self- and Parental-Regulation Surrounding Type I Diabetes Management in Late Adolescence. *Annals of Behavioral Medicine* **52**:1, 29-41. [[Crossref](#)]
63. Rachel Baker, Daniel Klasik, Sean F. Reardon. 2018. Race and Stratification in College Enrollment Over Time. *AERA Open* **4**:1, 233285841775189. [[Crossref](#)]
64. Suwei Feng, Qiang Li. 2018. Evaluating the car ownership control policy in Shanghai: a structural vector auto-regression approach. *Transportation* **45**:1, 205-232. [[Crossref](#)]
65. Michael Jacobs Jr., Frank J. Sensenbrenner. 2018. A comparison of methodologies in the stress testing of credit risk – alternative scenario and dependency constructs. *Quantitative Finance and Economics* **2**:2, 294-324. [[Crossref](#)]
66. Yuliya Lovcha, Alejandro Perez-Laborda. 2018. Monetary policy shocks, inflation persistence, and long memory. *Journal of Macroeconomics* **55**, 117-127. [[Crossref](#)]
67. Rafael Yanushevsky, Camilla Yanushevsky. Problems and Tools of Applied Macroeconomics 1-48. [[Crossref](#)]
68. William Hankins, Anna-Leigh Stone, Chak Hung Jack Cheng, Ching-Wai (Jeremy) Chiu. 2018. Corporate Decision-Making in the Presence of Political Uncertainty: The Case of Corporate Cash Holdings. *SSRN Electronic Journal* . [[Crossref](#)]
69. Christina E. Bannier, Thomas Heyden. 2018. The Dynamics of SMEs' Capital Structure and Performance: Evidence From a Panel VAR. *SSRN Electronic Journal* . [[Crossref](#)]
70. Harun KAYA, Murat BELKE. 2017. TÜRKİYE EKONOMİSİNDE DÖVİZ KURU KANALININ ETKİNLİĞİ: 2003-2016 DÖNEMİ İÇİN VAR ANALİZİ. *Mehmet Akif Ersoy Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi* **4**:2, 28-47. [[Crossref](#)]
71. Christian Menden, Christian R. Proaño. 2017. Dissecting the financial cycle with dynamic factor models. *Quantitative Finance* **17**:12, 1965-1994. [[Crossref](#)]
72. Minxian Yang. 2017. Effects of idiosyncratic shocks on macroeconomic time series. *Empirical Economics* **53**:4, 1441-1461. [[Crossref](#)]
73. Baah Aye Kusi, Elikplimi Komla Agbloyor, Kwadjo Ansah-Adu, Agyapomaa Gyeke-Dako. 2017. Bank credit risk and credit information sharing in Africa: Does credit information sharing institutions and context matter?. *Research in International Business and Finance* **42**, 1123-1136. [[Crossref](#)]
74. Conor Donovan, Eóin T. Flaherty, Eimear Quinn Healy. 2017. Using big data from Wikipedia page views for official tourism statistics. *Statistical Journal of the IAOS* **33**:4, 997-1003. [[Crossref](#)]
75. Harun Kaya, Murat BELKE. 2017. TÜRKİYE'DE PARA POLİTİKALARININ KREDİ KANALI AKTARIMI: VAR YAKLAŞIMI. *Finans Ekonomi ve Sosyal Araştırmalar Dergisi* . [[Crossref](#)]

76. Jianlei Han, Zheyao Pan. 2017. On the relation between liquidity and the futures-cash basis: Evidence from a natural experiment. *Journal of Financial Markets* **36**, 115-131. [[Crossref](#)]
77. Drew D. Creal, Jing Cynthia Wu. 2017. MONETARY POLICY UNCERTAINTY AND ECONOMIC FLUCTUATIONS. *International Economic Review* **58**:4, 1317-1354. [[Crossref](#)]
78. Florent Rouxelin, Wan Wongsunwai, Nir Yehuda. 2017. Aggregate Cost Stickiness in GAAP Financial Statements and Future Unemployment Rate. *The Accounting Review* . [[Crossref](#)]
79. Anže Burger, Jože P. Damijan, Črt Kostevc, Matija Rojec. 2017. Determinants of firm performance and growth during economic recession: The case of Central and Eastern European countries. *Economic Systems* . [[Crossref](#)]
80. Lars E.O. Svensson. 2017. Cost-benefit analysis of leaning against the wind. *Journal of Monetary Economics* **90**, 193-213. [[Crossref](#)]
81. Knut Are Aastveit, Gisle James Natvik, Sergio Sola. 2017. Economic uncertainty and the influence of monetary policy. *Journal of International Money and Finance* **76**, 50-67. [[Crossref](#)]
82. DongHyuk Lee, Raymond J. Carroll, Samiran Sinha. 2017. Frequentist standard errors of Bayes estimators. *Computational Statistics* **32**:3, 867-888. [[Crossref](#)]
83. Foued Saâdaoui, Mouna Mrad. 2017. Stochastic modelling of the price-volume relationship in electricity markets: Evidence from the Nordic energy exchange. *International Transactions on Electrical Energy Systems* **27**:9, e2362. [[Crossref](#)]
84. Malte Knüppel, Guido Schulte Frankenfeld. 2017. Interest rate assumptions and predictive accuracy of central bank forecasts. *Empirical Economics* **53**:1, 195-215. [[Crossref](#)]
85. LENA LAVINAS, ELIANE DE ARAÚJO. 2017. Reforma da previdência e regime complementar*. *Brazilian Journal of Political Economy* **37**:3, 615-635. [[Crossref](#)]
86. Axel Jochem, Stefan Reitz. 2017. The role of global financial conditions for credit supply in EMU periphery countries. *Applied Economics Letters* **24**:10, 727-731. [[Crossref](#)]
87. Selim Akhter, Kevin Daly. 2017. Contagion risk for Australian banks from global systemically important banks: Evidence from extreme events. *Economic Modelling* **63**, 191-205. [[Crossref](#)]
88. Xiangrong Ma, Jianping Ge, Wei Wang. 2017. The relationship between urbanization, income growth and carbon dioxide emissions and the policy implications for China: a cointegrated vector error correction (VEC) analysis. *Natural Hazards* **87**:2, 1017-1033. [[Crossref](#)]
89. André Hajek, Christian Brettschneider, Marion Eisele, Dagmar Lühmann, Silke Mamone, Birgitt Wiese, Siegfried Weyerer, Jochen Werle, Angela Fuchs, Michael Pentzek, Janine Stein, Tobias Luck, Horst Bickel, Edelgard Mösch, Kathrin Heser, Michael Wagner, Wolfgang Maier, Martin Scherer, Steffi G. Riedel-Heller, Hans-Helmut König. 2017. Disentangling the complex relation of disability and depressive symptoms in old age – findings of a multicenter prospective cohort study in Germany. *International Psychogeriatrics* **29**:6, 885-895. [[Crossref](#)]
90. Biqing Cai, Jiti Gao, Dag Tjøstheim. 2017. A New Class of Bivariate Threshold Cointegration Models. *Journal of Business & Economic Statistics* **35**:2, 288-305. [[Crossref](#)]
91. Suppawong Tuarob, Conrad S. Tucker, Soundar Kumara, C. Lee Giles, Aaron L. Pincus, David E. Conroy, Nilam Ram. 2017. How are you feeling?: A personalized methodology for predicting mental states from temporally observable physical and behavioral information. *Journal of Biomedical Informatics* **68**, 1-19. [[Crossref](#)]
92. Jean Dubé, Charles-David Babin, Jean-Christophe Dubé, Hemza Lekkat, Alexandre Potvin, Olivier Ringue. 2017. What comes first, residential or commercial development? Measuring the causal links for a Canadian city over a century. *Letters in Spatial and Resource Sciences* **10**:1, 57-74. [[Crossref](#)]
93. Robert Apel, Henda Y. Hsu. Interrupted Time Series Analysis in the Study of Terrorism 276-293. [[Crossref](#)]

94. Marco Capasso, Koen Frenken, Tania Treibich. 2017. Sectoral co-movements of employment growth at regional level. *Economic Systems Research* **29**:1, 82-104. [[Crossref](#)]
95. Christian Gouriéroux, Alain Monfort, Jean-Paul Renne. 2017. Statistical inference for independent component analysis: Application to structural VAR models. *Journal of Econometrics* **196**:1, 111-126. [[Crossref](#)]
96. Paul Mylonas, Nikos S. Magginas. Non-performing Loans in the Greek Banking System: Navigating Through the “Perfect Storm” 275-306. [[Crossref](#)]
97. Feng-Jun Liu, Jiang-Nan Qiu, Na Zhao. 2017. Modeling Dynamics of Wikipedia: An Empirical Analysis Using a Vector Error Correction Model. *ITM Web of Conferences* **12**, 03019. [[Crossref](#)]
98. John J. Heim. Methodology 39-114. [[Crossref](#)]
99. Maria Sole Pagliari, Swarnali Ahmed Hannan. 2017. The Volatility of Capital Flows in Emerging Markets: Measures and Determinants. *IMF Working Papers* **17**:41, 1. [[Crossref](#)]
100. Wen Cheong Chin, Min Cherng Lee. 2017. High-frequency volatility combine forecast evaluations: An empirical study for DAX. *The Journal of Finance and Data Science* **3**:1-4, 1-12. [[Crossref](#)]
101. Christina Papagiannopoulou, Diego G. Miralles, Stijn Decubber, Matthias Demuzere, Niko E. C. Verhoest, Wouter A. Dorigo, Willem Waegeman. 2017. A non-linear Granger-causality framework to investigate climate–vegetation dynamics. *Geoscientific Model Development* **10**:5, 1945-1960. [[Crossref](#)]
102. Dennis Bonam, Jakob <!-->de Haan, Beau Soederhuizen. 2017. The Effects of Fiscal Policy at the Effective Lower Bound. *SSRN Electronic Journal* . [[Crossref](#)]
103. Stefan Bruder, Michael Wolf. 2017. Balanced Bootstrap Joint Confidence Bands for Structural Impulse Response Functions. *SSRN Electronic Journal* . [[Crossref](#)]
104. Liuan Wang, Lu (Lucy) Yan, Xitong Guo, Gregory R. Heim. 2017. Modeling Physicianss Dynamic Behaviors in an Online Healthcare Community: An Empirical Study Using a Vector Autoregression Approach. *SSRN Electronic Journal* . [[Crossref](#)]
105. Juha-Pekka Junttila. 2017. Discounting the Deficit into Debt: The 3D Dilemma for the OECD Countries. *SSRN Electronic Journal* . [[Crossref](#)]
106. Nuttanan Wichitaksorn. 2017. Analyzing Multiple Vector Autoregressions Through Matrix-Variate Normal Distribution with Two Covariance Matrices. *SSRN Electronic Journal* . [[Crossref](#)]
107. Alona Zharova, Wolfgang K. HHrdle, Stefan Lessmann. 2017. Is Scientific Performance a Function of Funds?. *SSRN Electronic Journal* . [[Crossref](#)]
108. Xiaohui Chen, Mengyu Xu, Wei Biao Wu. 2016. Regularized Estimation of Linear Functionals of Precision Matrices for High-Dimensional Time Series. *IEEE Transactions on Signal Processing* **64**:24, 6459-6470. [[Crossref](#)]
109. Filippo Gori. 2016. Banking integration and monetary policy fragmentation in the eurozone. *International Economics and Economic Policy* **16**. . [[Crossref](#)]
110. Nana Kwasi Karikari, Sam Mensah, Simon K. Harvey. 2016. Do remittances promote financial development in Africa?. *SpringerPlus* **5**:1. . [[Crossref](#)]
111. Ali Anari, James Kolari. 2016. Dynamics of interest and inflation rates. *Journal of Empirical Finance* **39**, 129-144. [[Crossref](#)]
112. Stelios D. Bekiros, Alessia Paccagnini. 2016. Policy-Oriented Macroeconomic Forecasting with Hybrid DGSE and Time-Varying Parameter VAR Models. *Journal of Forecasting* **35**:7, 613-632. [[Crossref](#)]
113. Keshab Bhattarai. 2016. Unemployment–inflation trade-offs in OECD countries. *Economic Modelling* **58**, 93-103. [[Crossref](#)]

114. Jose L. Diaz-Sanchez, Aristomene Varoudakis. 2016. Tracking the causes of eurozone external imbalances: new evidence and some policy implications. *International Economics and Economic Policy* 13:4, 641-668. [[Crossref](#)]
115. Suresh Nallareddy, Maria Ogneva. 2016. Predicting Restatements in Macroeconomic Indicators using Accounting Information. *The Accounting Review* . [[Crossref](#)]
116. Christoph Frey, Frieder Mokinski. 2016. Forecasting with Bayesian Vector Autoregressions Estimated Using Professional Forecasts. *Journal of Applied Econometrics* 31:6, 1083-1099. [[Crossref](#)]
117. Lindsey A. Gallo, Rebecca N. Hann, Congcong Li. 2016. Aggregate earnings surprises, monetary policy, and stock returns. *Journal of Accounting and Economics* 62:1, 103-120. [[Crossref](#)]
118. Gianluca Cafiso. 2016. Non-residents' Holdings, Market Volatility and Public Debt Sustainability. An Analysis with Data for Italy. *Review of International Economics* 24:3, 484-513. [[Crossref](#)]
119. Tao Yuan, Gang Li, Zhaohui Zhang, S. Joe Qin. Deep causal mining for plant-wide oscillations with multilevel Granger causality analysis 5056-5061. [[Crossref](#)]
120. Eduardo Loría. 2016. MÉXICO: CRECIMIENTO ECONÓMICO RESTRINGIDO Y TIPO DE CAMBIO, 1950-2014. *Problemas del Desarrollo* 47:186, 133-160. [[Crossref](#)]
121. Malika Akhatova, Mohd Pital Zainal, Mansor H. Ibrahim. 2016. Banking Models and Monetary Transmission Mechanisms in Malaysia: Are Islamic Banks Different?. *Economic Papers: A journal of applied economics and policy* 35:2, 169-183. [[Crossref](#)]
122. Sajjad F. Dizaji, Mohammad Reza Farzanegan, Alireza Naghavi. 2016. Political institutions and government spending behavior: theory and evidence from Iran. *International Tax and Public Finance* 23:3, 522-549. [[Crossref](#)]
123. Cindrella Shah, Nilesh Ghonasgi. 2016. Determinants and Forecast of Price Level in India: a VAR Framework. *Journal of Quantitative Economics* 14:1, 57-86. [[Crossref](#)]
124. Konstantinos N. Konstantakis, Panayotis G. Michaelides, Angelos T. Vouldis. 2016. Non performing loans (NPLs) in a crisis economy: Long-run equilibrium analysis with a real time VEC model for Greece (2001–2015). *Physica A: Statistical Mechanics and its Applications* 451, 149-161. [[Crossref](#)]
125. Saravanan Kesavan, Tarun Kushwaha, Vishal Gaur. 2016. Do High and Low Inventory Turnover Retailers Respond Differently to Demand Shocks?. *Manufacturing & Service Operations Management* 18:2, 198-215. [[Crossref](#)]
126. Ann-Kathrin Blankenberg, Guido Buenstorf. 2016. Regional co-evolution of firm population, innovation and public research? Evidence from the West German laser industry. *Research Policy* 45:4, 857-868. [[Crossref](#)]
127. Chieh-Hsuan Wang, Jen-Te Hwang, Chien-Ping Chung. 2016. Do short-term international capital inflows drive China's asset markets?. *The Quarterly Review of Economics and Finance* 60, 115-124. [[Crossref](#)]
128. Abhishek Borah, Gerard J. Tellis. 2016. Halo (Spillover) Effects in Social Media: Do Product Recalls of One Brand Hurt or Help Rival Brands?. *Journal of Marketing Research* 53:2, 143-160. [[Crossref](#)]
129. Christos Agiakloglou, Michalis Gkouvakis, Aggelos Kanas. 2016. Causality in EU macroeconomic variables. *Applied Economics Letters* 23:4, 264-277. [[Crossref](#)]
130. Daniel Felix Ahegbey, Monica Billio, Roberto Casarin. 2016. Bayesian Graphical Models for Structural Vector Autoregressive Processes. *Journal of Applied Econometrics* 31:2, 357-386. [[Crossref](#)]
131. JING CYNTHIA WU, FAN DORA XIA. 2016. Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound. *Journal of Money, Credit and Banking* 48:2-3, 253-291. [[Crossref](#)]
132. ###, ###. 2016. A Comparative Study on Return Spillovers in the Stock Markets of Korea, China and Japan. *Journal of North-east Asian Cultures* 1:46, 379-415. [[Crossref](#)]

133. Stephen Hansen, Michael McMahon. 2016. Shocking language: Understanding the macroeconomic effects of central bank communication. *Journal of International Economics* **99**, S114-S133. [[Crossref](#)]
134. Jie Qin, Tai-Quan Peng. 2016. Googling environmental issues. *Internet Research* **26**:1, 57-73. [[Crossref](#)]
135. Paul Whiteley, Harold D. Clarke, David Sanders, Marianne Stewart. 2016. Why Do Voters Lose Trust in Governments? Public Perceptions of Government Honesty and Trustworthiness in Britain 2000–2013. *The British Journal of Politics and International Relations* **18**:1, 234-254. [[Crossref](#)]
136. J. Fernández-Villaverde, J.F. Rubio-Ramírez, F. Schorfheide. Solution and Estimation Methods for DSGE Models 527-724. [[Crossref](#)]
137. Nuno Palma. 2016. The Existence and Persistence of Liquidity Effects: Evidence from a Large-Scale Historical Natural Experiment. *SSRN Electronic Journal* . [[Crossref](#)]
138. Jianlei Han, Zheyao Pan. 2016. On the Relation between Liquidity and the Futures-Cash Basis: Evidence from a Natural Experiment. *SSRN Electronic Journal* . [[Crossref](#)]
139. Daniela Scida. 2016. Structural VAR and Financial Networks: A Minimum Distance Approach to Spatial Modeling. *SSRN Electronic Journal* . [[Crossref](#)]
140. Tendongho Charles. 2016. The Impact of Foreign Aid on the Economic Growth of Cameroon (1960-2013) Using a Multivariate Autoregressive Model. *SSRN Electronic Journal* . [[Crossref](#)]
141. Moonkyoung Jang, Seongmin Jeon, Byungjoon Yoo, Jongil Kim, Changhee Han. Does Too Much Regulation Kill the Online Gambling Industry?: An Empirical Analysis of Regulation Effects Using VAR Model 212-216. [[Crossref](#)]
142. James R. Liddle. Disentangling Religion and Morality: An Analysis of Religiosity in the United States 217-243. [[Crossref](#)]
143. George Tzagkarakis, Juliana Caicedo-Llano, Thomas Dionysopoulos. 2015. Sparse modeling of volatile financial time series via low-dimensional patterns over learned dictionaries. *Algorithmic Finance* **4**:3-4, 139-158. [[Crossref](#)]
144. Chor Foon Tang, Eu Chye Tan. 2015. Tourism-Led Growth Hypothesis in Malaysia: Evidence Based Upon Regime Shift Cointegration and Time-Varying Granger Causality Techniques. *Asia Pacific Journal of Tourism Research* **20**:sup1, 1430-1450. [[Crossref](#)]
145. Dag Kolsrud. 2015. A Time-Simultaneous Prediction Box for a Multivariate Time Series. *Journal of Forecasting* **34**:8, 675-693. [[Crossref](#)]
146. Chandler Lutz. 2015. The impact of conventional and unconventional monetary policy on investor sentiment. *Journal of Banking & Finance* **61**, 89-105. [[Crossref](#)]
147. Nasser Khiabani. 2015. Oil inflows and housing market fluctuations in an oil-exporting country: Evidence from Iran. *Journal of Housing Economics* **30**, 59-76. [[Crossref](#)]
148. Luba Petersen. 2015. Do expectations and decisions respond to monetary policy?. *Journal of Economic Studies* **42**:6, 972-1004. [[Crossref](#)]
149. Goran Petrevski, Jane Bogoev, Dragan Tevdovski. 2015. The transmission of foreign shocks to South Eastern European economies. *Empirica* **42**:4, 747-767. [[Crossref](#)]
150. David Chapman, Mark A. Cane, Naomi Henderson, Dong Eun Lee, Chen Chen. 2015. A Vector Autoregressive ENSO Prediction Model. *Journal of Climate* **28**:21, 8511-8520. [[Crossref](#)]
151. André Hajek, Christian Brettschneider, Annette Ernst, Carolin Lange, Birgitt Wiese, Jana Prokein, Siegfried Weyerer, Jochen Werle, Michael Pentzek, Angela Fuchs, Janine Stein, Horst Bickel, Edelgard Mösch, Kathrin Heser, Frank Jessen, Wolfgang Maier, Martin Scherer, Steffi G. Riedel-Heller, Hans-Helmut König. 2015. Complex coevolution of depression and health-related quality of life in old age. *Quality of Life Research* **24**:11, 2713-2722. [[Crossref](#)]

152. Chris Redl. 2015. Noisy news and exchange rates: A SVAR approach. *Journal of International Money and Finance* **58**, 150-171. [[Crossref](#)]
153. Dilek Temiz, Aytaç Gökmen, Mukhtar Salisu Abubakar. 2015. Foreign Direct Investment and Its Impact on Economic Performance: The Case of Turkey and Nigeria. *Journal of Transnational Management* **20**:4, 207-230. [[Crossref](#)]
154. Thomas Brenner, Matthias Duschl. 2015. Causal dynamic effects in regional systems of technological activities: a SVAR approach. *The Annals of Regional Science* **55**:1, 103-130. [[Crossref](#)]
155. Juan M. Nave, Javier Ruiz. 2015. Risk aversion and monetary policy in a global context. *Journal of Financial Stability* **20**, 14-35. [[Crossref](#)]
156. Maarten J. Gijsenberg, Harald J. Van Heerde, Peter C. Verhoef. 2015. Losses Loom Longer than Gains: Modeling the Impact of Service Crises on Perceived Service Quality over Time. *Journal of Marketing Research* **52**:5, 642-656. [[Crossref](#)]
157. Elie Bouri. 2015. Return and volatility linkages between oil prices and the Lebanese stock market in crisis periods. *Energy* **89**, 365-371. [[Crossref](#)]
158. Hailiang Chen, Prabuddha De, Yu Jeffrey Hu. 2015. IT-Enabled Broadcasting in Social Media: An Empirical Study of Artists' Activities and Music Sales. *Information Systems Research* **26**:3, 513-531. [[Crossref](#)]
159. Tom Broekel. 2015. The Co-evolution of Proximities – A Network Level Study. *Regional Studies* **49**:6, 921-935. [[Crossref](#)]
160. Michael Wolf, Dan Wunderli. 2015. Bootstrap Joint Prediction Regions. *Journal of Time Series Analysis* **36**:3, 352-376. [[Crossref](#)]
161. Valentina Bruno, Hyun Song Shin. 2015. Capital flows and the risk-taking channel of monetary policy. *Journal of Monetary Economics* **71**, 119-132. [[Crossref](#)]
162. Michele Polline Verissimo, Vanessa Marzano Araújo. 2015. Desempenho da indústria automobilística brasileira no período 2000-2012: uma análise sobre a hipótese de desindustrialização setorial. *Economia e Sociedade* **24**:1, 151-176. [[Crossref](#)]
163. Sean Yom. 2015. From Methodology to Practice. *Comparative Political Studies* **48**:5, 616-644. [[Crossref](#)]
164. Manuel Leonard F. Albis, Dennis S. Mapa. 2015. Bayesian averaging of classical estimates in asymmetric vector autoregressive models 1. *Communications in Statistics - Simulation and Computation* **0**-0. [[Crossref](#)]
165. John Boland. 2015. Spatial-temporal forecasting of solar radiation. *Renewable Energy* **75**, 607-616. [[Crossref](#)]
166. Joo Hyung Lee, Yun Hwan Key, Ho Chang Song, Jonghyun Lim. 2015. Effects of Volume Regulation on Urban Spaces in Seoul, South Korea. *Journal of Urban Planning and Development* **141**:1, 05014008. [[Crossref](#)]
167. Danbee Park, Joocheol Kim. 2015. Financial Derivatives Usage and Monetary Policy Transmission: Evidence from Korean Firm-level Data. *Global Economic Review* **44**:1, 101-115. [[Crossref](#)]
168. Alan Marco, Shawn Miller, Ted Sichelman. 2015. Do Economic Downturns Dampen Patent Litigation?. *Journal of Empirical Legal Studies* **12**:3, 481. [[Crossref](#)]
169. Yu-Hsi Chou, Jyh-Lin Wu. 2015. THE TAYLOR PRINCIPLE IN THE LONG RUN: AN EMPIRICAL PERSPECTIVE. *Contemporary Economic Policy* **33**:1, 66-86. [[Crossref](#)]
170. Brian C. Payne, John M. Geppert. 2015. Health care and the cross-section of US stock returns. *Journal of Economics and Finance* **39**:1, 153-170. [[Crossref](#)]

171. Wen-Chi Liao, Daxuan Zhao, Li Ping Lim, Grace Khei Mie Wong. 2015. Foreign liquidity to real estate market: Ripple effect and housing price dynamics. *Urban Studies* 52:1, 138-158. [[Crossref](#)]
172. Moon Kyoung Jang, Seongmin Jeon, Jong Il Kim, Byungjoon Yoo. 2015. An Empirical Analysis of Regulation Policy Effects on Social Casino Using Vector Autoregression. *SSRN Electronic Journal* . [[Crossref](#)]
173. Heiner Mikosch, Stefan Neuwirth. 2015. Real-Time Forecasting with a MIDAS VAR. *SSRN Electronic Journal* . [[Crossref](#)]
174. Sajjad Faraji Dizaji, Mohammad Reza Farzanegan, Alireza Naghavi. 2015. Political Institutions and Government Spending Behavior: Theory and Evidence from Iran. *SSRN Electronic Journal* . [[Crossref](#)]
175. Heiner Mikosch, Stefan Neuwirth. 2015. Real-Time Forecasting with a MIDAS VAR. *SSRN Electronic Journal* . [[Crossref](#)]
176. Sajjad Faraji Dizaji, Mohammad Reza Farzanegan, Alireza Naghavi. 2015. Political Institutions and Government Spending Behavior: Theory and Evidence from Iran. *SSRN Electronic Journal* . [[Crossref](#)]
177. Suwei Feng, Qiang Li. 2015. Evaluating the Car Ownership Control Policy in Shanghai: A Structural Vector Auto-Regression Approach. *SSRN Electronic Journal* . [[Crossref](#)]
178. Maria Kalli, Jim E. Griffin. 2015. Bayesian Nonparametric Vector Autoregressive Models. *SSRN Electronic Journal* . [[Crossref](#)]
179. Enrique M. Quilis. 2015. Genetic Algorithm Calibration of Seasonal BVAR Models. *SSRN Electronic Journal* . [[Crossref](#)]
180. Biqing Cai, Jiti Gao, Dag Tjostheim. 2015. A New Class of Bivariate Threshold Cointegration Models. *SSRN Electronic Journal* . [[Crossref](#)]
181. Yangru Wu, Xing Zhou. VAR Models: Estimation, Inferences, and Applications 2077-2091. [[Crossref](#)]
182. Alex Miksjuk, Sam Ouliaris, Mikhail Pranovich. 2015. The Game of Anchors: Studying the Causes of Currency Crises in Belarus. *IMF Working Papers* 15:281, 1. [[Crossref](#)]
183. Matthias Deschryvere. 2014. R&D, firm growth and the role of innovation persistence: an analysis of Finnish SMEs and large firms. *Small Business Economics* 43:4, 767-785. [[Crossref](#)]
184. J. Tielens, B. van Aarle, J. Van Hove. 2014. Effects of Eurobonds: A stochastic sovereign debt sustainability analysis for Portugal, Ireland and Greece. *Journal of Macroeconomics* 42, 156-173. [[Crossref](#)]
185. Ronald A. Ratti, Joaquin L. Vespignani. 2014. Commodity Prices and BRIC and G3 Liquidity: A SFAVEC Approach. *Journal of Banking & Finance* . [[Crossref](#)]
186. Elie Bouri, Georges Azzi. 2014. On the Dynamic Transmission of Mean and Volatility across the Arab Stock Markets. *Journal of Emerging Market Finance* 13:3, 279-304. [[Crossref](#)]
187. Roseline Nyakerario Misati, Alfred Shem Ouma, Kethi Ngoka-Kisinguh. Financial Architecture and Monetary Policy Transmission Mechanism in Kenya 341-364. [[Crossref](#)]
188. John Silvia, Azhar Iqbal. 2014. Is the Fed Funds Rate Still Effective?. *Business Economics* 49:4, 253-262. [[Crossref](#)]
189. Kuo Cheng Kuo, Sue Ling Lai, Khunlaphat Chancham, Ming Liu. 2014. Energy Consumption, GDP, and Foreign Direct Investment in Germany. *Applied Mechanics and Materials* 675-677, 1797-1809. [[Crossref](#)]
190. Arwiphawee Srithongrungrung, Kenneth A. Kriz. 2014. The Impact of Subnational Fiscal Policies on Economic Growth: A Dynamic Analysis Approach. *Journal of Policy Analysis and Management* 33:4, 912-928. [[Crossref](#)]
191. Diego Fresoli, Esther Ruiz, Lorenzo Pascual. 2014. Bootstrap multi-step forecasts of non-Gaussian VAR models. *International Journal of Forecasting* . [[Crossref](#)]

192. Refet S. Gürkaynak, Burçin Kısacıkoğlu, Barbara Rossi. Do DSGE Models Forecast More Accurately Out-Of-Sample than VAR Models? 27-79. [[Crossref](#)]
193. Michele Poline Verissimo, Clésio Lourenço Xavier. 2014. Tipos de commodities, taxa de câmbio e crescimento econômico: evidências da maldição dos recursos naturais para o Brasil. *Revista de Economia Contemporânea* **18**:2, 267-295. [[Crossref](#)]
194. Mohammed Hassan, Magda Kandil. 2014. Government spending decomposition: priorities toward anchoring higher growth. *Middle East Development Journal* **6**:2, 232-254. [[Crossref](#)]
195. Robert W. Rutledge, Khondkar E. Karim, Chensheng Li. 2014. A Study of the Relationship between Renminbi Exchange Rates and Chinese Stock Prices. *International Economic Journal* **28**:3, 381-403. [[Crossref](#)]
196. Jongmin Yu, Mindy L. Mallory. 2014. Exchange Rate Effect on Carbon Credit Price via Energy Markets. *Journal of International Money and Finance* . [[Crossref](#)]
197. Rina Bhattacharya. 2014. Inflation Dynamics and Monetary Policy Transmission in Vietnam and Emerging Asia. *Journal of Asian Economics* . [[Crossref](#)]
198. Sajjad Faraji Dizaji. 2014. The effects of oil shocks on government expenditures and government revenues nexus (with an application to Iran's sanctions). *Economic Modelling* **40**, 299-313. [[Crossref](#)]
199. Mohammad Reza Farzanegan. 2014. Military Spending and Economic Growth: The Case of Iran. *Defence and Peace Economics* **25**:3, 247-269. [[Crossref](#)]
200. Georgios Karras. 2014. Is Fiscal Policy More Effective During Cyclical Downturns?. *International Economic Journal* **28**:2, 255-271. [[Crossref](#)]
201. Ryan R. Brady. 2014. The Spatial Diffusion of Regional Housing Prices across U.S. States. *Regional Science and Urban Economics* . [[Crossref](#)]
202. Elie I. Bouri, Georges Yahchouchi. 2014. Do return and volatility traverse the Middle Eastern and North African (MENA) stock markets borders?. *Journal of Economic Studies* **41**:2, 317-344. [[Crossref](#)]
203. Steven C. Michael. 2014. Can franchising be an economic development strategy? An empirical investigation. *Small Business Economics* **42**:3, 611-620. [[Crossref](#)]
204. Stelios D. Bekiros, Alessia Paccagnini. 2014. Bayesian forecasting with small and medium scale factor-augmented vector autoregressive DSGE models. *Computational Statistics & Data Analysis* **71**, 298-323. [[Crossref](#)]
205. Stelios Bekiros. 2014. Forecasting with a state space time-varying parameter VAR model: Evidence from the Euro area. *Economic Modelling* **38**, 619-626. [[Crossref](#)]
206. Marinko Škare. 2014. How useful is the golden triangle law in economics?. *Technological and Economic Development of Economy* **20**:1, 133-153. [[Crossref](#)]
207. Janine Aron, Ronald Macdonald, John Muellbauer. 2014. Exchange Rate Pass-Through in Developing and Emerging Markets: A Survey of Conceptual, Methodological and Policy Issues, and Selected Empirical Findings. *The Journal of Development Studies* **50**:1, 101-143. [[Crossref](#)]
208. Matthijs Lof, Tseday Jemaneh Mekasha, Finn Tarp. 2014. Aid and Income: Another Time-series Perspective. *World Development* . [[Crossref](#)]
209. Sunoong Hwang, Seong-hwan Min, Donghyun Shin, KIHOO KIM. 2014. (Understanding the Evolution of Sectoral Comovements: The Case of Korea). *SSRN Electronic Journal* . [[Crossref](#)]
210. Sean Collins, L. Christopher Plantier. 2014. Are Bond Mutual Fund Flows Destabilizing? Examining the Evidence from the 'Täper Tantrum'. *SSRN Electronic Journal* . [[Crossref](#)]
211. P. A. Nazarov, Maria Kazakova. 2014. (Methodological Principles of Prediction of Tax Revenues of Budgetary System). *SSRN Electronic Journal* . [[Crossref](#)]

212. Guillaume Cleaud, Matthieu Lemoine, Pierre-Alain Pionnier. 2014. Which Size and Evolution of the Government Expenditure Multiplier in France (1980-2010)? *SSRN Electronic Journal* . [\[Crossref\]](#)
213. Joris Tielens, Bas Van Aarle, Jan Van Hove. 2014. Effects of Eurobonds: A Stochastic Sovereign Debt Sustainability Analysis for Portugal, Ireland and Greece. *SSRN Electronic Journal* . [\[Crossref\]](#)
214. Suresh Nallareddy, Maria Ogneva. 2014. Predicting Restatements in Macroeconomic Indicators Using Accounting Information. *SSRN Electronic Journal* . [\[Crossref\]](#)
215. P. A. Nazarov, Maria Kazakova. 2014. (Development of Prediction Model of Basic Budget Parameters in Russian Federation). *SSRN Electronic Journal* . [\[Crossref\]](#)
216. P. A. Nazarov, Maria Kazakova. 2014. (Theoretical Basis of Prediction of Main Budget Parameters of Country). *SSRN Electronic Journal* . [\[Crossref\]](#)
217. Stefan Bruder. 2014. Comparing Several Methods to Compute Joint Prediction Regions for Path Forecasts Generated by Vector Autoregressions. *SSRN Electronic Journal* . [\[Crossref\]](#)
218. Refet S. Gürkaynak, Burçin Kısacıkoğlu, Barbara Rossi. Do DSGE Models Forecast More Accurately Out-Of-Sample than VAR Models? 27-79. [\[Crossref\]](#)
219. Jinyong Kim, Yong-Cheol Kim. 2013. Financial crisis and a transmission mechanism of external shocks: The signaling role of the Korean Monetary Stabilization Bond. *Journal of Financial Stability* 9:4, 682-694. [\[Crossref\]](#)
220. Albert Wijeweera, Michael Charles. 2013. An Empirical Analysis of the Determinants of Passenger Rail Demand in Melbourne, Australia. *Economic Analysis and Policy* 43:3, 249-264. [\[Crossref\]](#)
221. Rangan Gupta, Faaiqa Hartley. 2013. The Role of Asset Prices in Forecasting Inflation and Output in South Africa. *Journal of Emerging Market Finance* 12:3, 239-291. [\[Crossref\]](#)
222. S. Mansoob Murshed, Muhammad Saleh. 2013. Human Capital Accumulation in Pakistan in the Light of Debt, Military Expenditure and Politics. *Journal of Human Development and Capabilities* 14:4, 520-558. [\[Crossref\]](#)
223. Sajjad Faraji Dizaji, Peter A G van Bergeijk. 2013. Potential early phase success and ultimate failure of economic sanctions. *Journal of Peace Research* 50:6, 721-736. [\[Crossref\]](#)
224. Alessio Moneta, Doris Entner, Patrik O. Hoyer, Alex Coad. 2013. Causal Inference by Independent Component Analysis: Theory and Applications*. *Oxford Bulletin of Economics and Statistics* 75:5, 705-730. [\[Crossref\]](#)
225. Junko Koeda. 2013. Endogenous monetary policy shifts and the term structure: Evidence from Japanese government bond yields. *Journal of the Japanese and International Economies* 29, 170-188. [\[Crossref\]](#)
226. Antonio Paradiso, Saten Kumar, B. Bhaskara Rao. 2013. A New Keynesian IS curve for Australia: is it forward looking or backward looking?. *Applied Economics* 45:26, 3691-3700. [\[Crossref\]](#)
227. Deepankar Basu, Ying Chen, Jong-seok Oh. 2013. Class struggle and economic fluctuations: VAR analysis of the post-war US economy. *International Review of Applied Economics* 27:5, 575-596. [\[Crossref\]](#)
228. Stelios Bekiros, Alessia Paccagnini. 2013. On the predictability of time-varying VAR and DSGE models. *Empirical Economics* 45:1, 635-664. [\[Crossref\]](#)
229. Patrick Brämer, Horst Gischer, Toni Richter, Mirko Weiß. 2013. Competition in banks' lending business and its interference with ECB monetary policy. *Journal of International Financial Markets, Institutions and Money* 25, 144-162. [\[Crossref\]](#)
230. Òscar Jordà, Malte Knüppel, Massimiliano Marcellino. 2013. Empirical simultaneous prediction regions for path-forecasts. *International Journal of Forecasting* 29:3, 456-468. [\[Crossref\]](#)

231. Mohammed Dore, Roelof Makken, Erik Eastman. 2013. The Monetary Transmission Mechanism, Non-residential Fixed Investment and Housing. *Atlantic Economic Journal* . [[Crossref](#)]
232. Roseline Nyakerario Misati, Esman Morekwa Nyamongo, Isaac Mwangi. 2013. Commodity price shocks and inflation in a net oil-importing economy. *OPEC Energy Review* 37:2, 125-148. [[Crossref](#)]
233. Laurent Jeanpierre, Éric Monnet. 2013. Manières de dire l'avenir sans nier l'incertitude : de l'économie aux sciences du climat. Entretien avec Michel Armatte. *Tracés* :24, 217-229. [[Crossref](#)]
234. Martin Binder, Felix Ward. 2013. The Structure of Subjective Well-being: A Vector Autoregressive Approach. *Metroeconomica* 64:2, 361-400. [[Crossref](#)]
235. Elie I. Bouri. 2013. Do Fine Wines Blend with Crude Oil? Seizing the Transmission of Mean and Volatility Between Two Commodity Prices. *Journal of Wine Economics* 8:1, 49-68. [[Crossref](#)]
236. Anna Staszewska-Bystrova, Peter Winker. 2013. Constructing narrowest pathwise bootstrap prediction bands using threshold accepting. *International Journal of Forecasting* 29:2, 221-233. [[Crossref](#)]
237. Keshab Bhattacharai, Sushanta Mallick. 2013. Impact of China's currency valuation and labour cost on the US in a trade and exchange rate model. *The North American Journal of Economics and Finance* . [[Crossref](#)]
238. Michele Poline Veríssimo, Clésio Lourenço Xavier. 2013. Taxa de câmbio, exportações e crescimento: uma investigação sobre a hipótese de doença holandesa no Brasil. *Revista de Economia Política* 33:1, 82-101. [[Crossref](#)]
239. MAREK RUSNAK, TOMAS HAVRANEK, ROMAN HORVATH. 2013. How to Solve the Price Puzzle? A Meta-Analysis. *Journal of Money, Credit and Banking* 45:1, 37-70. [[Crossref](#)]
240. Jean-Baptiste Gossé, Cyriac Guillaumin. 2013. L'apport de la représentation VAR de Christopher A. Sims à la science économique. *L'Actualité économique* 89:4, 305. [[Crossref](#)]
241. Aaron Reeves, Sanjay Basu, Martin McKee, Christopher Meissner, David Stuckler. 2013. Does investment in the health sector promote or inhibit economic growth?. *Globalization and Health* 9:1, 43. [[Crossref](#)]
242. Abubakar S. Garba, Fariastuti Djafar, Shazali Abu Mansor. 2013. Evidence of Opportunity and Necessity Driven Entrepreneurship in Nigeria. *Journal of Entrepreneurship, Management and Innovation* 9:3, 57-78. [[Crossref](#)]
243. Hailiang Chen, Prabuddha De, Yu Jeffrey Hu. 2013. IT-Enabled Broadcasting in Social Media: An Empirical Study of Artists' Activities and Music Sales. *SSRN Electronic Journal* . [[Crossref](#)]
244. Jing Cynthia Wu, Fan Dora Xia. 2013. Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound. *SSRN Electronic Journal* . [[Crossref](#)]
245. Stelios D Bekiros, Alessia Paccagnini. 2013. Policy-Oriented Macroeconomic Forecasting With Hybrid DSGE and Time-Varying Parameter VAR Models. *SSRN Electronic Journal* . [[Crossref](#)]
246. Gebhard Kirchgässner, Jürgen Wolters, Uwe Hassler. Vector Autoregressive Processes 127-154. [[Crossref](#)]
247. Zhi Qiao, Guangyan Huang, Jing He, Peng Zhang, Li Guo, Jie Cao, Yanchun Zhang. Discovering Semantics from Multiple Correlated Time Series Stream 509-520. [[Crossref](#)]
248. Jongmin Yu, Mindy L. Mallory. 2013. Exchange Rate Effect on Carbon Credit Price via Energy Markets. *SSRN Electronic Journal* . [[Crossref](#)]
249. Knut Are Aastveit, Gisle James Natvik, sergio sola. 2013. Economic Uncertainty and the Effectiveness of Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
250. Andrr Hajek. 2013. Endogeneity in the Relation between Poverty, Wealth and Life Satisfaction. *SSRN Electronic Journal* . [[Crossref](#)]

251. Rina Bhattacharya. 2013. Inflation Dynamics and Monetary Policy Transmission in Vietnam and Emerging Asia. *IMF Working Papers* 13:155, 1. [[Crossref](#)]
252. Greg Hannsgen. 2012. Infinite-variance, alpha-stable shocks in monetary SVAR. *International Review of Applied Economics* 26:6, 755-786. [[Crossref](#)]
253. K. Abildgren. 2012. Financial structures and the real effects of credit-supply shocks in Denmark 1922-2011. *European Review of Economic History* 16:4, 490-510. [[Crossref](#)]
254. Shiu-Sheng Chen, Yu-Hsi Chou. 2012. Rational expectations, changing monetary policy rules, and real exchange rate dynamics. *Journal of Banking & Finance* 36:10, 2824-2836. [[Crossref](#)]
255. James P. Cover, Sushanta K. Mallick. 2012. Identifying sources of macroeconomic and exchange rate fluctuations in the UK. *Journal of International Money and Finance* 31:6, 1627-1648. [[Crossref](#)]
256. Matteo Fragetta, Giovanni Melina. 2012. Identification of monetary policy in SVAR models: a data-oriented perspective. *Empirical Economics* . [[Crossref](#)]
257. Hiroshi Nishi. 2012. Structural VAR analysis of debt, capital accumulation, and income distribution in the Japanese economy: a Post Keynesian perspective. *Journal of Post Keynesian Economics* 34:4, 685-712. [[Crossref](#)]
258. Philip D. Habel. 2012. Following the Opinion Leaders? The Dynamics of Influence Among Media Opinion, the Public, and Politicians. *Political Communication* 29:3, 257-277. [[Crossref](#)]
259. Marika Karanassou, Hector Sala. 2012. PRODUCTIVITY GROWTH AND THE PHILLIPS CURVE: A REASSESSMENT OF THE US EXPERIENCE. *Bulletin of Economic Research* 64:3, 344-366. [[Crossref](#)]
260. Gediminas Adomavicius, Jesse Bockstedt, Alok Gupta. 2012. Modeling Supply-Side Dynamics of IT Components, Products, and Infrastructure: An Empirical Analysis Using Vector Autoregression. *Information Systems Research* 23:2, 397-417. [[Crossref](#)]
261. Vito Polito, Mike Wickens. 2012. Optimal monetary policy using an unrestricted VAR. *Journal of Applied Econometrics* 27:4, 525-553. [[Crossref](#)]
262. Vito Polito, Mike Wickens. 2012. A model-based indicator of the fiscal stance. *European Economic Review* 56:3, 526-551. [[Crossref](#)]
263. Kim Abildgren. 2012. Business cycles and shocks to financial stability: empirical evidence from a new set of Danish quarterly national accounts 1948-2010. *Scandinavian Economic History Review* 60:1, 50-78. [[Crossref](#)]
264. Lawrence J. Christiano. 2012. Christopher A. Sims and Vector Autoregressions*. *The Scandinavian Journal of Economics* 114:4, 1082. [[Crossref](#)]
265. Jongtae Shin, Hyun Shin, P.M. Rao. 2012. User innovation and knowledge sourcing: The case of financial software. *The Journal of High Technology Management Research* 23:1, 58-70. [[Crossref](#)]
266. B. Starr McMullen, Nathan Eckstein. 2012. Relationship between Vehicle Miles Traveled and Economic Activity. *Transportation Research Record: Journal of the Transportation Research Board* 2297:1, 21-28. [[Crossref](#)]
267. Daniel Felix Ahelegbey, Monica Billio, Roberto Casarin. 2012. Bayesian Graphical Models for Structural Vector Autoregressive Processes. *SSRN Electronic Journal* . [[Crossref](#)]
268. Michael Wolf, Dan Wunderli. 2012. Bootstrap Joint Prediction Regions. *SSRN Electronic Journal* . [[Crossref](#)]
269. Allen N. Berger, Christa H. S. Bouwman. 2012. Bank Liquidity Creation, Monetary Policy, and Financial Crises. *SSRN Electronic Journal* . [[Crossref](#)]

270. Jérôme Creel, Paola Monperrus-Veroni, Francesco Saraceno. 2012. Discretionary Policy Interactions and the Fiscal Theory of the Price Level: A SVAR Analysis on French Data. *SSRN Electronic Journal* . [[Crossref](#)]
271. Dushko Josheski, Darko Lazarov. 2012. Nominal Effective Exchange Rate Neutrality: The Case of Macedonia. *SSRN Electronic Journal* . [[Crossref](#)]
272. Paul Wakke. 2012. Macroeconomic Causes and Effects of Formal Service Standardization. *SSRN Electronic Journal* . [[Crossref](#)]
273. Jinyong Kim, Yong-Cheol Kim. 2012. Financial Crisis and a Transmission Mechanism of External Shocks: The Signaling Role of the Korean Monetary Stabilization Bond. *SSRN Electronic Journal* . [[Crossref](#)]
274. Vadhindran K. Rao. 2012. Innovation Accounting with Incomplete Identification of a Structural VAR – An Application to Exchange Rates. *SSRN Electronic Journal* . [[Crossref](#)]
275. Rifqi Ardliansyah. 2012. Stock Market Integration and International Portfolio Diversification between U.S. and ASEAN Equity Markets. *SSRN Electronic Journal* . [[Crossref](#)]
276. Mohammad Reza Farzanegan. 2011. Oil revenue shocks and government spending behavior in Iran. *Energy Economics* **33**:6, 1055-1069. [[Crossref](#)]
277. Vito Polito, Michael Wickens. 2011. Assessing the fiscal stance in the European Union and the United States, 1970-2011. *Economic Policy* **26**:68, 599-647. [[Crossref](#)]
278. Matthias Buerger, Tom Broekel, Alex Coad. 2011. Regional Dynamics of Innovation: Investigating the Co-evolution of Patents, Research and Development (R&D), and Employment. *Regional Studies* 1-18. [[Crossref](#)]
279. Shih-Chang Hung, Yu-Chuan Hsu. 2011. Managing TFT-LCDs under uncertainty: When crystal cycles meet business cycles. *Technological Forecasting and Social Change* **78**:7, 1104-1114. [[Crossref](#)]
280. BARBARA ROSSI, SARAH ZUBAIRY. 2011. What Is the Importance of Monetary and Fiscal Shocks in Explaining U.S. Macroeconomic Fluctuations?. *Journal of Money, Credit and Banking* **43**:6, 1247-1270. [[Crossref](#)]
281. Jianqing Fan, Jinchi Lv, Lei Qi. 2011. Sparse High-Dimensional Models in Economics. *Annual Review of Economics* **3**:1, 291-317. [[Crossref](#)]
282. Efrem Castelnuovo. 2011. Testing the Structural Interpretation of the Price Puzzle with a Cost-Channel Model*. *Oxford Bulletin of Economics and Statistics* no-no. [[Crossref](#)]
283. Jang C. Jin. 2011. The Effects of Tourism on Economic Growth in Hong Kong. *Cornell Hospitality Quarterly* **52**:3, 333-340. [[Crossref](#)]
284. David R. Gibson. 2011. All the News That Fits to Print: Desk Competition for Front-Page Space at The New York Times1. *Sociological Forum* **26**:2, 287-305. [[Crossref](#)]
285. Ryan R. Brady. 2011. Measuring the diffusion of housing prices across space and over time. *Journal of Applied Econometrics* **26**:2, 213-231. [[Crossref](#)]
286. Alex Coad, Tom Broekel. 2011. Firm growth and productivity growth: evidence from a panel VAR. *Applied Economics* 1-19. [[Crossref](#)]
287. Zhuo Li, Hui Zhao. 2011. Not all demand oil shocks are alike: disentangling demand oil shocks in the crude oil market. *Journal of Chinese Economic and Foreign Trade Studies* **4**:1, 28-44. [[Crossref](#)]
288. H. Tan. 2011. Cyclical industrial dynamics in the global IT sector: origins and sequencing. *Industrial and Corporate Change* **20**:1, 175-200. [[Crossref](#)]
289. David M. Kemme, Gennady Lyakir. 2011. From Peg to Float: Exchange Market Pressure and Monetary Policy in the Czech Republic. *Review of International Economics* **19**:1, 93-108. [[Crossref](#)]

290. Eduardo Loria. 2011. Inflation, Monetary Policy and Economic Growth in Mexico. An Inverse Causation, 1970-2009. *Modern Economy* 02:05, 834-845. [[Crossref](#)]
291. Barbara Rossi, Sarah Zubairy. 2011. What is the Importance of Monetary and Fiscal Shocks in Explaining US Macroeconomic Fluctuations?. *SSRN Electronic Journal* . [[Crossref](#)]
292. Alycia Chin, Missaka Warusawitharana. 2011. Financial Market Shocks During the Great Depression. *SSRN Electronic Journal* . [[Crossref](#)]
293. Tian Rongjie, Jiawen Yang. 2011. Macro Stress Testing on Credit Risk of Commercial Banks in China Based on Vector Autoregression Models. *SSRN Electronic Journal* . [[Crossref](#)]
294. Marek Rusnák, Tomas Havranek, Roman Horvath. 2011. How to Solve the Price Puzzle? A Meta-Analysis. *SSRN Electronic Journal* . [[Crossref](#)]
295. Hui Zhu, Allan Gregory. 2011. Updating Forecasts in Vector Autoregression Models with an Application to the Canadian Banking Industry. *SSRN Electronic Journal* . [[Crossref](#)]
296. Shafik Hebous. 2010. THE EFFECTS OF DISCRETIONARY FISCAL POLICY ON MACROECONOMIC AGGREGATES: A REAPPRAISAL. *Journal of Economic Surveys* no-no. [[Crossref](#)]
297. A. Coad. 2010. Exploring the processes of firm growth: evidence from a vector auto-regression. *Industrial and Corporate Change* 19:6, 1677-1703. [[Crossref](#)]
298. Sushanta K. Mallick, Mohammed Mohsin. 2010. On the real effects of inflation in open economies: theory and empirics. *Empirical Economics* 39:3, 643-673. [[Crossref](#)]
299. Jang C. Jin. 2010. RESEARCH PUBLICATIONS, ECONOMIC GROWTH AND CAUSALITY: JAPAN'S EXPERIENCE. *Pacific Economic Review* 15:5, 666-673. [[Crossref](#)]
300. John L. Moran, Patricia J. Solomon. 2010. Conventional and advanced time series estimation: application to the Australian and New Zealand Intensive Care Society (ANZICS) adult patient database, 1993-2006. *Journal of Evaluation in Clinical Practice* no-no. [[Crossref](#)]
301. Owen Q. Wu, Hong Chen. 2010. Optimal Control and Equilibrium Behavior of Production-Inventory Systems. *Management Science* 56:8, 1362-1379. [[Crossref](#)]
302. Sharon Brooks, Bereket Kebede, Edward Allison, John Reynolds. 2010. The Balance of Power in Rural Marketing Networks: A Case Study of Snake Trading in Cambodia. *Journal of Development Studies* 46:6, 1003-1025. [[Crossref](#)]
303. Òscar Jordà, Massimiliano Marcellino. 2010. Path forecast evaluation. *Journal of Applied Econometrics* 25:4, 635-662. [[Crossref](#)]
304. Guangling "Dave" Liu, Rangan Gupta, Eric Schaling. 2010. Forecasting the South African economy: a hybrid-DSGE approach. *Journal of Economic Studies* 37:2, 181-195. [[Crossref](#)]
305. JINHO BAE. 2010. THE DYNAMICS OF POST-WAR US INFLATION: THE LIMITED ROLE OF TIME INCONSISTENCY. *The Manchester School* no-no. [[Crossref](#)]
306. Alex Coad, Rekha Rao. 2010. Firm growth and R&D expenditure. *Economics of Innovation and New Technology* 19:2, 127-145. [[Crossref](#)]
307. Marika Karanassou, Hector Sala, Dennis J. Snower. 2010. PHILLIPS CURVES AND UNEMPLOYMENT DYNAMICS: A CRITIQUE AND A HOLISTIC PERSPECTIVE. *Journal of Economic Surveys* 24:1, 1-51. [[Crossref](#)]
308. Dan S. Rickman. 2010. MODERN MACROECONOMICS AND REGIONAL ECONOMIC MODELING. *Journal of Regional Science* 50:1, 23-41. [[Crossref](#)]
309. Anna Staszewska-Bystrova. 2010. Bootstrap prediction bands for forecast paths from vector autoregressive models. *Journal of Forecasting* n/a-n/a. [[Crossref](#)]
310. Yangru Wu, Xing Zhou. VAR Models: Estimation, Inferences, and Applications 1391-1398. [[Crossref](#)]

311. Alan C. Marco, Ted M. Sichelman. 2010. Do Economic Downturns Dampen Patent Litigation?. *SSRN Electronic Journal* . [[Crossref](#)]
312. Frank Schorfheide. Bayesian methods in macroeconometrics 28-34. [[Crossref](#)]
313. Svetlana Vtyurina, Fahad Alturki. 2010. Inflation in Tajikistan: Forecasting Analysis and Monetary Policy Challenges. *IMF Working Papers* **10**:17, 1. [[Crossref](#)]
314. Albert Wijeweera, Matthew Webb. 2009. MILITARY SPENDING AND ECONOMIC GROWTH IN SRI LANKA: A TIME SERIES ANALYSIS. *Defence and Peace Economics* **20**:6, 499-508. [[Crossref](#)]
315. CHARLES L. EVANS, DAVID A. MARSHALL. 2009. Fundamental Economic Shocks and the Macroeconomy. *Journal of Money, Credit and Banking* **41**:8, 1515-1555. [[Crossref](#)]
316. Jérôme Creel, Paola Monperrus-Veroni, Francesco Saraceno. 2009. ON THE LONG-TERM EFFECTS OF FISCAL POLICY IN THE UNITED KINGDOM: THE CASE FOR A GOLDEN RULE. *Scottish Journal of Political Economy* **56**:5, 580-607. [[Crossref](#)]
317. CARLO ALTAVILLA, MATTEO CICCARELLI. 2009. The Effects of Monetary Policy on Unemployment Dynamics under Model Uncertainty: Evidence from the United States and the Euro Area. *Journal of Money, Credit and Banking* **41**:7, 1265-1300. [[Crossref](#)]
318. Kai-Yin Woo, Shu-Kam Lee. 2009. Detecting intra-national PPP model in China: A median-unbiased estimation approach. *Economic Modelling* **26**:5, 1029-1032. [[Crossref](#)]
319. Òscar Jordà. 2009. Simultaneous Confidence Regions for Impulse Responses. *Review of Economics and Statistics* **91**:3, 629-647. [[Crossref](#)]
320. Mark Partridge, Dan Rickman. 2009. Canadian regional labour market evolutions: a long-run restrictions SVAR analysis. *Applied Economics* **41**:15, 1855-1871. [[Crossref](#)]
321. Julian di Giovanni, Justin McCrary, Till von Wachter. 2009. Following Germany's Lead: Using International Monetary Linkages to Estimate the Effect of Monetary Policy on the Economy. *Review of Economics and Statistics* **91**:2, 315-331. [[Crossref](#)]
322. Spencer S. Jones, R. Scott Evans, Todd L. Allen, Alun Thomas, Peter J. Haug, Shari J. Welch, Gregory L. Snow. 2009. A multivariate time series approach to modeling and forecasting demand in the emergency department. *Journal of Biomedical Informatics* **42**:1, 123-139. [[Crossref](#)]
323. Herbert L. Smith. 2009. Application de l'analyse des séries chronologiques à la projection d'effectifs de population scolaire par la méthode des composantes. *Cahiers québécois de démographie* **38**:1, 145. [[Crossref](#)]
324. Leonardo Melosi. 2009. A Likelihood Analysis of Models with Information Frictions. *SSRN Electronic Journal* . [[Crossref](#)]
325. Anna Staszewska-Bystrova. 2009. Bootstrap Confidence Bands for Forecast Paths. *SSRN Electronic Journal* . [[Crossref](#)]
326. Efram Castelnuovo. 2009. Testing the Structural Interpretation of the Price Puzzle with a Cost Channel Model. *SSRN Electronic Journal* . [[Crossref](#)]
327. Alycia Chin, Missaka Warusawitharana. 2009. Financial Market Shocks during the Great Depression. *SSRN Electronic Journal* . [[Crossref](#)]
328. James Peery Cover, Sushanta K. Mallick. 2009. Identifying Sources of Macroeconomic and Exchange Rate Fluctuations in the UK. *SSRN Electronic Journal* . [[Crossref](#)]
329. Efram Castelnuovo, Paolo Surico. 2009. Monetary Policy, Inflation Expectations and the Price Puzzle. *SSRN Electronic Journal* . [[Crossref](#)]
330. Sebastian Sosa, Paul Cashin. 2009. Macroeconomic Fluctuations in the Caribbean: The Role of Climatic and External Shocks. *IMF Working Papers* **09**:159, 1. [[Crossref](#)]

331. Eduiges Romanatto, Gabriel Porcile, Marcelo Curado. 2008. Produtividade, salários e taxa de câmbio: uma análise da experiência brasileira nos anos 1990. *Revista de Economia Contemporânea* 12:3, 545-570. [[Crossref](#)]
332. Jeffrey W. Ladewig. 2008. Housing Starts and the Political Business Cycle. *American Politics Research* 36:5, 776-798. [[Crossref](#)]
333. Alessio Moneta. 2008. Graphical causal models and VARs: an empirical assessment of the real business cycles hypothesis. *Empirical Economics* 35:2, 275-300. [[Crossref](#)]
334. João R. Sato, Sergi Costafreda, Pedro A. Morettin, Michael John Brammer. 2008. Measuring Time Series Predictability Using Support Vector Regression. *Communications in Statistics - Simulation and Computation* 37:6, 1183-1197. [[Crossref](#)]
335. Guangling Liu, Rangan Gupta, Eric Schaling. 2008. Forecasting the South African Economy: A DSGE-VAR Approach. *SSRN Electronic Journal* . [[Crossref](#)]
336. Hector Sala, Marika Karanassou. 2008. Productivity Growth and the Phillips Curve: A Reassessment of the US Experience. *SSRN Electronic Journal* . [[Crossref](#)]
337. Don H. Kim. 2008. Challenges in Macro-Finance Modeling. *SSRN Electronic Journal* . [[Crossref](#)]
338. Harri Hasko. 2008. 'Some Unpleasant Fiscal Arithmetic': The Role of Monetary and Fiscal Policy in Public Debt Dynamics Since the 1970s. *SSRN Electronic Journal* . [[Crossref](#)]
339. Rangan Gupta, Eric Schaling, Dave Liu. 2008. Forecasting the South African Economy: A DSGE-VAR Approach. *SSRN Electronic Journal* . [[Crossref](#)]
340. Frank Schorfheide. Bayesian Methods in Macroeconometrics 1-6. [[Crossref](#)]
341. Wenchao Liao. 2008. Trading Activity in the Treasury Futures Market and Its Role in Futures Price Fluctuations. *SSRN Electronic Journal* . [[Crossref](#)]
342. Juha-Pekka Junttila, Marko Korhonen. 2008. Utilizing Financial Market Information in Forecasting Real Growth, Inflation and Real Exchange Rate. *SSRN Electronic Journal* . [[Crossref](#)]
343. Sandro Momigliano, Raffaella Giordano, Stefano Neri, Roberto Perotti. 2008. The Effects of Fiscal Policy in Italy: Evidence from a VAR Model. *SSRN Electronic Journal* . [[Crossref](#)]
344. Alexandru Minea, Christophe Rault. 2008. Some New Insights into Currency Boards: Evidence from Bulgaria. *SSRN Electronic Journal* . [[Crossref](#)]
345. Mario Jorge Cardoso Mendonca, Luis Alberto Medrano, Adolfo Sachsida. 2008. The Effects of Monetary Policy in Brazil: Results from Agnostic Identification. *SSRN Electronic Journal* . [[Crossref](#)]
346. Sebastian Sosa. 2008. External Shocks and Business Cycle Fluctuations in Mexico: How Important Are U.S. Factors?. *IMF Working Papers* 08:100, 1. [[Crossref](#)]
347. Silvia Gonçalves, Lutz Kilian. 2007. Asymptotic and Bootstrap Inference for $AR(\infty)$ Processes with Conditional Heteroskedasticity. *Econometric Reviews* 26:6, 609-641. [[Crossref](#)]
348. Sushanta K. Mallick, Mohammed Mohsin. 2007. Monetary policy in high inflation open economies: evidence from Israel and Turkey. *International Journal of Finance & Economics* 12:4, 405-415. [[Crossref](#)]
349. Kosei Fukuda. 2007. Reexamination of the effects of monetary policy using spectral decomposition. *Applied Economics Letters* 14:10, 769-774. [[Crossref](#)]
350. Wen-Hsien Liu. 2007. Forecasting the semiconductor industry cycles by bootstrap prediction intervals. *Applied Economics* 39:13, 1731-1742. [[Crossref](#)]
351. Jérôme Creel, Paola Monperrus-Veroni, Francesco Saraceno. 2007. Politique budgétaire discrétionnaire en France. *Revue économique* 58:5, 1035. [[Crossref](#)]
352. Gebhard Kirchgässner, Jürgen Wolters. Vector Autoregressive Processes 125-151. [[Crossref](#)]

353. Jerome Creel, Paola Monperrus-Veroni, Francesco Saraceno. 2007. Has the Golden Rule of Public Finance Made a Difference in the UK?. *SSRN Electronic Journal* . [[Crossref](#)]
354. Oscar Jorda. 2007. Inference for Impulse Responses. *SSRN Electronic Journal* . [[Crossref](#)]
355. Harri Hasko. 2007. Public Debt Dynamics in Selected OECD Countries: The Role of Fiscal Stabilisation and Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
356. International Monetary Fund. 2007. Mexico: Selected Issues. *IMF Staff Country Reports* **07**:378, 1. [[Crossref](#)]
357. Philip Hans Franses. 2006. On modeling panels of time series. *Statistica Neerlandica* **60**:4, 438-456. [[Crossref](#)]
358. G. Corsetti, G. J. Muller. 2006. Twin deficits: squaring theory, evidence and common sense. *Economic Policy* **21**:48, 598-638. [[Crossref](#)]
359. Patrice Guillotreau, Ramón Jiménez-Toribio. 2006. The Impact of Electronic Clock Auction Systems on Shellfish Prices: Econometric Evidence from a Structural Change Model. *Journal of Agricultural Economics* **57**:3, 523-546. [[Crossref](#)]
360. Jérôme Creel, Paola Monperrus-Veroni, Francesco Saraceno. 2006. Estimating the Impact of Public Investment for the United Kingdom: Has the Golden Rule of Public Finance Made a Difference?. *SSRN Electronic Journal* . [[Crossref](#)]
361. Jorge E. Restrepo, Hernan Rincon Rincón. 2006. Identifying Fiscal Policy Shocks in Chile and Colombia. *SSRN Electronic Journal* . [[Crossref](#)]
362. Ky Tran. 2006. Monetary Policy in Vietnam: Evidence from a Structural VAR. *SSRN Electronic Journal* . [[Crossref](#)]
363. W LIU. 2005. Determinants of the semiconductor industry cycles. *Journal of Policy Modeling* **27**:7, 853-866. [[Crossref](#)]
364. Alessio Moneta. 2005. Causality in macroeconometrics: some considerations about reductionism and realism. *Journal of Economic Methodology* **12**:3, 433-453. [[Crossref](#)]
365. Frank Browne, David Doran. 2005. Do equity index industry groups improve forecasts of inflation and production? A US analysis. *Applied Economics* **37**:15, 1801-1812. [[Crossref](#)]
366. Giorgio E. Primiceri. 2005. Time Varying Structural Vector Autoregressions and Monetary Policy. *The Review of Economic Studies* **72**:3, 821-852. [[Crossref](#)]
367. Felix Hammermann. Do Exchange Rates Matter in Inflation Targeting Regimes? Evidence from a VAR Analysis for Poland and Chile 115-148. [[Crossref](#)]
368. Jerome Creel, Paola Monperrus-Veroni, Francesco Saraceno. 2005. Discretionary Policy Interactions and the Fiscal Theory of the Price Level: A SVAR Analysis on French Data. *SSRN Electronic Journal* . [[Crossref](#)]
369. Elcyon C.R. Lima, Brise Vasquez, Alexis Maka. 2005. Monetary Policy, Inflation and the Level of Economic Activity in Brazil after the Real Plan: Stylized Facts from Svar Models. *SSRN Electronic Journal* . [[Crossref](#)]
370. Roger C. Williams. 2004. Monetary policy and unemployment: A disaggregated analysis. *International Advances in Economic Research* **10**:3, 180-190. [[Crossref](#)]
371. Dale Bremmer, Randy Kesselring. 2004. Divorce and female labor force participation: Evidence from times-series data and cointegration. *Atlantic Economic Journal* **32**:3, 175-190. [[Crossref](#)]
372. Roberto Perotti. 2004. Estimating the Effects of Fiscal Policy in OECD Countries. *SSRN Electronic Journal* . [[Crossref](#)]
373. M Partridge. 2003. The waxing and waning of regional economies: the chicken-egg question of jobs versus people. *Journal of Urban Economics* **53**:1, 76-97. [[Crossref](#)]

- 374. Giorgio E. Primiceri. 2003. Time Varying Structural Vector Autoregressions and Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
- 375. Eric Zivot, Jiahui Wang. Vector Autoregressive Models for Multivariate Time Series 369-413. [[Crossref](#)]
- 376. Michael Kumhof, Luis Felipe Céspedes, Eric Parrado. 2003. Pricing Policies and Inflation Inertia. *IMF Working Papers* **03:87**, 1. [[Crossref](#)]
- 377. Ivana S. Domazet, Darko M. Marjanović. FDI as a Factor of Improving the Competitiveness of Developing Countries 82-104. [[Crossref](#)]
- 378. Ezebuilo R. Ukwueze, Chinasa E. Urama, Henry T. Asogwa, Oliver E. Ogbonna. Political Economy of Growth Effects of Defense Expenditure in Nigeria 403-426. [[Crossref](#)]
- 379. . Vector Autoregressive Models for Multivariate Time Series 385-429. [[Crossref](#)]