

Estimation and Inference of Impulse Responses by Local Projections

By ÒSCAR JORDÀ*

This paper introduces methods to compute impulse responses without specification and estimation of the underlying multivariate dynamic system. The central idea consists in estimating local projections at each period of interest rather than extrapolating into increasingly distant horizons from a given model, as it is done with vector autoregressions (VAR). The advantages of local projections are numerous: (1) they can be estimated by simple regression techniques with standard regression packages; (2) they are more robust to misspecification; (3) joint or point-wise analytic inference is simple; and (4) they easily accommodate experimentation with highly nonlinear and flexible specifications that may be impractical in a multivariate context. Therefore, these methods are a natural alternative to estimating impulse responses from VARs. Monte Carlo evidence and an application to a simple, closed-economy, new-Keynesian model clarify these numerous advantages. (JEL C32, E47, C53)

In response to the rigid identifying assumptions used in theoretical macroeconomics during the 1970s, Christopher A. Sims (1980) provided what has become the standard in empirical macroeconomic research: VARs. Since then, researchers in macroeconomics often compute dynamic multipliers of interest, such as impulse responses and forecast-error variance decompositions, by specifying a VAR even though the VAR per se is often of no particular interest.

There is no specific reason, however, to expect that the data are generated by a VAR. In fact, even assuming that a macroeconomy's variables are

well characterized by a VAR, Arnold Zellner and Franz Palm (1974) and Kenneth F. Wallis (1977) show that the macroeconomy's subset of variables that practitioners can analyze at one time will follow a vector autoregressive-moving average (VARMA) model instead. From a different angle, Thomas F. Cooley and Mark Dwyer (1998) show that the dynamics of basic real business cycle models often follow VARMA representations that are incompatible with VARs. These two observations often explain the relatively long lag lengths required in practice to properly calculate impulse responses with a VAR. Additionally, new second- and higher-order accurate solution techniques for nonlinear dynamic stochastic general equilibrium models (see, e.g., Jinill Kim et al., 2003) deliver equilibrium conditions that are polynomial (rather than linear) difference equations. VARs may indeed be a significantly misspecified representation of the data generating process (DGP).

Impulse responses (and variance decompositions) are important statistics in their own right: they provide the empirical regularities that substantiate theoretical models of the economy and are therefore a natural empirical objective. This paper introduces methods for computing impulse responses for a vector time series based on local projections (a term defined precisely in the

* Department of Economics, University of California, Davis, One Shields Ave., Davis, CA 95616-8578 (e-mail: ojorda@ucdavis.edu, URL: www.econ.ucdavis.edu/faculty/jorda). This version of the paper has benefited from the suggestions of three anonymous referees and the editor. I thank Paolo Angelini, Colin Cameron, John Cochrane, Timothy Cogley, James Hamilton, Peter Hansen, Kevin Hoover, Monika Piazzesi, Simon Potter, Peter Robinson, Shinichi Sakata, Aaron Smith, Daniel Thornton, and seminar participants at the Federal Reserve Bank of Kansas City, Indiana University, University of California, Davis, and University of California, Santa Cruz, for many useful suggestions. Massimiliano de Santis provided outstanding research assistance. I am thankful to the Institute of Governmental Affairs at U.C. Davis for financial support.

next section) that do not require specification and estimation of the unknown true multivariate dynamic system itself.

The advantages of local projections are numerous: they can be estimated by simple least squares; they provide appropriate inference (individual or joint) that does not require asymptotic delta-method approximations or numerical techniques for its calculation; they are robust to misspecification of the DGP; and they easily accommodate experimentation with highly nonlinear specifications that are often impractical or infeasible in a multivariate context. Since local projections can be estimated by univariate equation methods, they can be easily calculated with available standard regression packages and thus become a natural alternative to estimating impulse responses from VARs.

The key insight is that estimation of a model based on the sample, such as a VAR, represents a linear global approximation to the DGP ideal and is optimally designed for one-period ahead forecasting. Even when the model is misspecified, it may still produce reasonable one-period ahead forecasts (see James H. Stock and Mark W. Watson, 1999). An impulse response, however, is a function of forecasts at increasingly distant horizons, and therefore misspecification errors are compounded with the forecast horizon. This paper suggests that it is preferable to use a collection of projections local to each forecast horizon instead, thus matching design and evaluation.

Local projections are based on sequential regressions of the endogenous variable shifted several steps ahead and therefore have many points of commonality with direct multi-step forecasting. The ideas behind direct forecasting (sometimes also called adaptive forecasting or dynamic estimation) go back to at least David R. Cox (1961). Andrew A. Weiss (1991) establishes consistency and asymptotic normality of the direct forecasts under general conditions. The accuracy of direct forecasting has been evaluated in several papers. Ruey S. Tsay (1993) and Jin-Lung Lin and Tsay (1996) show that direct forecasting performs very well even relative to models where cointegrating restrictions are properly incorporated. Rajendra J. Bhansali (1996, 1997) and Ching-Kang Ing (2003) show that direct forecasts outperform

iterated forecasts for autoregressive models whose lag length is too short—a typical scenario when a VAR is used to approximate a VARMA model, for example. Bhansali (2002) provides a nice review on this recent literature.

Direct forecasting seeks an optimal multi-step forecast whereas the local projections proposed here seek a consistent estimate of the corresponding impulse response coefficients. Obviously, these objectives are not disjointed in much the same way that they are not when estimating a VAR.

The paper contains ample Monte Carlo evidence illustrating the basic consistency and efficiency properties of local projections under ideal conditions and under several forms of linear and nonlinear misspecifications, all relative to fixed parameter VARs and the more recent time-varying Bayesian VARs used in Timothy W. Cogley and Thomas J. Sargent (2001). As an illustration, I estimate impulse responses for a simple new-Keynesian model (see Jordi Galí, 1992; Jeffrey C. Fuhrer and George R. Moore, 1995a, 1995b; and references in John B. Taylor, 1999) based on cubic polynomial projections with threshold effects. The results are supportive of the view that the Federal Reserve faced a changing economic environment from the 1970s to mid-1980s (a view supported by, among others, Cogley and Sargent, 2001) rather than attributing the inflation-unemployment outcomes of the time to bad policy, as J. Bradford DeLong (1997) and Christina D. Romer and David H. Romer (2002) have suggested.

I. Estimation and Inference

A. Estimation

Impulse responses are almost universally estimated from the Wold decomposition of a linear multivariate Markov model such as a VAR. However, this two-step procedure consisting of first estimating the model and then inverting its estimates to find the impulse responses is justified only if the model coincides with the DGP. Furthermore, deriving correct impulse responses from cointegrated VARs can be extremely complicated (see Bruce E. Hansen, 2003). Instead, impulse responses can be de-

defined without reference to the unknown DGP, even when its Wold decomposition does not exist (see Gary Koop et al., 1996; Simon M. Potter, 2000). Specifically, an impulse response can be defined as the difference between two forecasts (see James D. Hamilton, 1994; Koop et al., 1996):

$$(1) \quad IR(t, s, \mathbf{d}_i) = E(\mathbf{y}_{t+s} | \mathbf{v}_t = \mathbf{d}_i; \mathbf{X}_t) - E(\mathbf{y}_{t+s} | \mathbf{v}_t = \mathbf{0}; \mathbf{X}_t) \quad s = 0, 1, 2, \dots$$

where the operator $E(\cdot)$ denotes the best, mean squared error predictor; \mathbf{y}_t is an $n \times 1$ random vector; $\mathbf{X}_t \equiv (\mathbf{y}_{t-1}, \mathbf{y}_{t-2}, \dots)'$; $\mathbf{0}$ is of dimension $n \times 1$; \mathbf{v}_t is the $n \times 1$ vector of reduced-form disturbances; and \mathbf{D} is an $n \times n$ matrix, whose columns \mathbf{d}_i contain the relevant experimental shocks.

Time provides a natural arrangement of the dynamic causal linkages among the variables in \mathbf{y}_t , but does not identify its contemporaneous causal relations. The VAR literature has often relied on assuming a Wold-causal order for the elements of \mathbf{y}_t to organize the triangular factorization of the reduced-form, residual variance-covariance matrix, $\mathbf{\Omega} = \mathbf{P}\mathbf{P}'$. Such an identification mechanism, for example, is equivalent to defining the experimental matrix as $\mathbf{D} = \mathbf{P}^{-1}$ so that its i^{th} column, \mathbf{d}_i , then represents the “structural shock” to the i^{th} element in \mathbf{y}_t (in the usual parlance of the VAR literature).

Statistical-based structural identification of contemporaneous causal links is so far elusive.¹ Further, a one-time shock to a given variable in the system may not be the only type of experiment of interest. For these reasons, and to encompass broad designs, the remainder of the analysis accommodates a generic choice of experiment \mathbf{D} without loss of generality. Identification is an important issue but not one that is explored in this paper.

Expression (1) shows that the statistical objective in calculating impulse responses is to obtain the best, mean-squared, multi-step pre-

dictions. These can be calculated by recursively iterating on an estimated model optimized to characterize the dependence structure of successive observations, of which a VAR is an example. While this approach is optimal if indeed the postulated model correctly represents the DGP, better multi-step predictions can often be found with direct forecasting models that are reestimated for each forecast horizon. Therefore, consider projecting \mathbf{y}_{t+s} onto the linear space generated by $(\mathbf{y}_{t-1}, \mathbf{y}_{t-2}, \dots, \mathbf{y}_{t-p})'$, specifically

$$(2) \quad \mathbf{y}_{t+s} = \boldsymbol{\alpha}^s + \mathbf{B}_1^{s+1}\mathbf{y}_{t-1} + \mathbf{B}_2^{s+1}\mathbf{y}_{t-2} + \dots + \mathbf{B}_p^{s+1}\mathbf{y}_{t-p} + \mathbf{u}_{t+s}^s \quad s = 0, 1, 2, \dots, h$$

where $\boldsymbol{\alpha}^s$ is an $n \times 1$ vector of constants, and the \mathbf{B}_i^{s+1} are matrices of coefficients for each lag i and horizon $s + 1$ (this timing convention will become clear momentarily). I denote the collection of h regressions in (2) as *local projections*, a term aptly evocative of nonparametric considerations.

According to definition (1), the impulse responses from the local-linear projections in (2) are

$$(3) \quad \widehat{IR}(t, s, \mathbf{d}_i) = \hat{\mathbf{B}}_i^s \mathbf{d}_i \quad s = 0, 1, 2, \dots, h$$

with the obvious normalization $\mathbf{B}_1^0 = \mathbf{I}$. An extensive literature (see Bhansali, 2002, and references therein) on the direct, multi-step forecasts implied by (2) establishes their consistency and asymptotic normality properties (see Weiss, 1991). However, here we are interested in establishing the consistency and distributional properties of the estimates $\hat{\mathbf{B}}_i^s$ —the impulse response coefficients. This is rather straightforward: as the next section shows, the residuals \mathbf{u}_{t+s}^s in (2) are a moving average of the forecast errors from time t to $t + s$ and therefore uncorrelated with the regressors, which are dated $t - 1$ to $t - p$.

A few final practical comments conclude this section. First, the maximum lag p (which can be determined by information criteria, for example) need not be common to each horizon s (to see this consider a *VMA*(q) DGP, for example).

¹ Exceptions are the work by Granger and Swanson (1997), and Demiralp and Hoover (2003), for example.

Second, the lag length and the dimension of the vector \mathbf{y}_t will impose degree of-freedom constraints on the maximum practical horizon h for very small samples. Third, consistency does not require that the sequence of h system regressions in (2) be estimated jointly—the impulse response for the j^{th} variable in \mathbf{y}_t can be estimated by a univariate regression of y_{jt} onto $\mathbf{X}_t \equiv (\mathbf{y}_{t-1}, \mathbf{y}_{t-2}, \dots, \mathbf{y}_{t-p})'$.

Finally, local projections are also useful in computing the forecast-error variance decomposition. By definition, the error in forecasting \mathbf{y}_{t+s} is given from expression (2) by

$$\mathbf{y}_{t+s} - E(\mathbf{y}_{t+s}|\mathbf{X}_t) = \mathbf{u}_{t+s}^s \quad s = 0, 1, 2, \dots$$

from which the non-normalized mean squared error (MSE_u) is

$$MSE_u(E(\mathbf{y}_{t+s}|\mathbf{X}_t)) = E(\mathbf{u}_{t+s}^s \mathbf{u}_{t+s}^{s'}) \quad s = 0, 1, 2, \dots, h$$

The choice experiment \mathbf{D} renormalizes MSE_u into

$$(4) \quad MSE(E(\mathbf{y}_{t+s}|\mathbf{X}_t)) = \mathbf{D}^{-1} E(\mathbf{u}_{t+s}^s \mathbf{u}_{t+s}^{s'}) \mathbf{D}'^{-1} \quad s = 0, 1, 2, \dots, h$$

from which the traditional variance decompositions can be calculated by directly plugging in the sample-based equivalents from the projections in (2). For comparison, in traditional VARs the non-normalized MSE is

$$MSE_u(E(\mathbf{y}_{t+s}|\mathbf{X}_t)) = E(\mathbf{u}_t^0 \mathbf{u}_t^{0'}) + \Psi_1 E(\mathbf{u}_t^0 \mathbf{u}_t^{0'}) \Psi_1' + \dots + \Psi_s E(\mathbf{u}_t^0 \mathbf{u}_t^{0'}) \Psi_s' \quad s = 0, 1, 2, \dots, h$$

where the Ψ_i and $E(\mathbf{u}_t^0 \mathbf{u}_t^{0'})$ are derived from the moving-average representation and the residual variance-covariance matrix of the estimated VAR. The quality of the variance decompositions will therefore depend on how well the Ψ_i are approximated by the VAR.

B. Relation to VARs and Inference

A VAR specifies that the $n \times 1$ vector \mathbf{y}_t depends linearly on $\mathbf{X}_t \equiv (\mathbf{y}_{t-1}, \mathbf{y}_{t-2}, \dots, \mathbf{y}_{t-p})'$, through the expression

$$(5) \quad \mathbf{y}_t = \boldsymbol{\mu} + \Pi' \mathbf{X}_t + \mathbf{v}_t$$

where \mathbf{v}_t is an *i.i.d.* vector of disturbances and $\Pi' \equiv [\Pi_1 \Pi_2 \dots \Pi_p]$. The VAR(1) companion form to this VAR can be expressed by defining²

$$(6) \quad \mathbf{W}_t \equiv \begin{bmatrix} \mathbf{y}_t - \boldsymbol{\mu} \\ \mathbf{y}_{t-1} - \boldsymbol{\mu} \\ \vdots \\ \mathbf{y}_{t-p+1} - \boldsymbol{\mu} \end{bmatrix} \quad \mathbf{F} \equiv \begin{bmatrix} \Pi_1 & \Pi_2 & \dots & \Pi_{p-1} & \Pi_p \\ \mathbf{I} & 0 & \dots & 0 & 0 \\ 0 & \mathbf{I} & \dots & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & \dots & \mathbf{I} & 0 \end{bmatrix}; \quad \mathbf{v}_t \equiv \begin{bmatrix} \mathbf{v}_t \\ 0 \\ \vdots \\ 0 \end{bmatrix}$$

and then realizing that according to (5) and (6),

$$(7) \quad \mathbf{W}_t = \mathbf{F} \mathbf{W}_{t-1} + \mathbf{v}_t$$

from which s -step ahead forecasts can be easily computed since

$$\mathbf{W}_{t+s} = \mathbf{v}_{t+s} + \mathbf{F} \mathbf{v}_{t+s-1} + \dots + \mathbf{F}^s \mathbf{v}_t + \mathbf{F}^{s+1} \mathbf{W}_{t-1}$$

and therefore

$$(8) \quad \mathbf{y}_{t+s} - \boldsymbol{\mu} = \mathbf{v}_{t+s} + \mathbf{F}_1^1 \mathbf{v}_{t+s-1} + \dots + \mathbf{F}_1^s \mathbf{v}_t + \mathbf{F}_1^{s+1} (\mathbf{y}_{t-1} - \boldsymbol{\mu}) + \dots + \mathbf{F}_p^{s+1} (\mathbf{y}_{t-p} - \boldsymbol{\mu})$$

where \mathbf{F}_i^s is the i^{th} upper, $n \times n$ block of the matrix \mathbf{F}^s (i.e., \mathbf{F} raised to the power s).

Assuming \mathbf{W}_t is covariance-stationary (or, in other words, that the eigenvalues of \mathbf{F} lie inside the unit circle), the infinite vector moving-

² For a more detailed derivation of some of the expressions that follow, the reader should consult Hamilton (1994), Chapter 10.

average representation of the original VAR in expression (5) is

$$(9) \quad \mathbf{y}_t = \boldsymbol{\gamma} + \mathbf{v}_t + \mathbf{F}_1^1 \mathbf{v}_{t-1} + \mathbf{F}_1^2 \mathbf{v}_{t-2} \\ + \dots + \mathbf{F}_1^s \mathbf{v}_{t-s} + \dots$$

and the impulse response function is given by

$$IR(t, s, \mathbf{d}_i) = \mathbf{F}_1^s \mathbf{d}_i$$

Expression (8) establishes the relationship between the impulse responses calculated by local projection and with a VAR. Specifically, comparing expression (2), repeated here for convenience,

$$(10) \quad \mathbf{y}_{t+s} = \boldsymbol{\alpha}^s + \mathbf{B}_1^{s+1} \mathbf{y}_{t-1} + \mathbf{B}_2^{s+1} \mathbf{y}_{t-2} \\ + \dots + \mathbf{B}_p^{s+1} \mathbf{y}_{t-p} + \mathbf{u}_{t+s}^s \\ s = 0, 1, 2, \dots, h$$

with expression (8) rearranged,

$$(11) \quad \mathbf{y}_{t+s} = (\mathbf{I} - \mathbf{F}_1^s - \dots - \mathbf{F}_p^s) \boldsymbol{\mu} + \mathbf{F}_1^{s+1} \mathbf{y}_{t-1} \\ + \dots + \mathbf{F}_p^{s+1} \mathbf{y}_{t-p} \\ + (\mathbf{v}_{t+s} + \mathbf{F}_1^1 \mathbf{v}_{t+s-1} + \dots + \mathbf{F}_1^s \mathbf{v}_t)$$

it is obvious that,

$$\boldsymbol{\alpha}^s = (\mathbf{I} - \mathbf{F}_1^s - \dots - \mathbf{F}_p^s) \boldsymbol{\mu} \\ \mathbf{B}_1^{s+1} = \mathbf{F}_1^{s+1} \\ (12) \quad \mathbf{u}_{t+s}^s = (\mathbf{v}_{t+s} + \mathbf{F}_1^1 \mathbf{v}_{t+s-1} + \dots + \mathbf{F}_1^s \mathbf{v}_t).$$

Hence, when the DGP is the VAR in (5), expressions (10) and (11) establish the equivalence between impulse responses calculated by local projections and with this VAR. Expression (12) shows that the error terms of the local projection, \mathbf{u}_{t+s}^s , are a moving average of the forecast errors from time t to $t + s$, which knowledge can be used to improve efficiency.

Specifically, define $\mathbf{Y}_t \equiv (\mathbf{y}_{t+1}, \dots, \mathbf{y}_{t+h})$, $\mathbf{V}_t \equiv (\mathbf{v}_{t+1}, \dots, \mathbf{v}_{t+h})$, and $\mathbf{X}_t \equiv (\mathbf{y}_{t-1}, \mathbf{y}_{t-2}, \dots, \mathbf{y}_{t-p})$, so that we stack the h local projections in expression (10) and take advantage of the struc-

ture of the residuals implied by the VAR assumption and estimate the following system jointly:

$$(13) \quad \mathbf{Y}_t = \mathbf{X}_t \boldsymbol{\Psi} + \mathbf{V}_t \boldsymbol{\Phi}$$

where (ignoring the constant terms) the parameter matrices are constrained as follows

$$\boldsymbol{\Psi} = \begin{bmatrix} \mathbf{F}_1^1 & \mathbf{F}_1^2 & \dots & \mathbf{F}_1^h \\ \mathbf{F}_2^1 & \mathbf{F}_2^2 & \dots & \mathbf{F}_2^h \\ \vdots & \vdots & \dots & \vdots \\ \mathbf{F}_p^1 & \mathbf{F}_p^2 & \dots & \mathbf{F}_p^h \end{bmatrix} \\ \boldsymbol{\Phi} = \begin{bmatrix} \mathbf{I}_n & \mathbf{F}_1^1 & \dots & \mathbf{F}_1^h \\ 0 & \mathbf{I}_n & \dots & \mathbf{F}_1^{h-1} \\ \vdots & \vdots & \dots & \vdots \\ 0 & 0 & \dots & \mathbf{I}_n \end{bmatrix}$$

Defining $E(\mathbf{v}_t \mathbf{v}_t') = \boldsymbol{\Omega}_v$, then $E(\mathbf{V}_t \mathbf{V}_t') = \boldsymbol{\Phi}(\mathbf{I}_h \otimes \boldsymbol{\Omega}_v) \boldsymbol{\Phi}' \equiv \boldsymbol{\Sigma}$.

Maximum likelihood estimation of this system can then be accomplished by standard GLS formulas according to

$$(14) \quad \text{vec}(\hat{\boldsymbol{\Psi}}) = [(\mathbf{I} \otimes \mathbf{X})' \boldsymbol{\Sigma}^{-1} (\mathbf{I} \otimes \mathbf{X})]^{-1} \\ \times (\mathbf{I} \otimes \mathbf{X})' \boldsymbol{\Sigma}^{-1} \text{vec}(\mathbf{Y})$$

The usual impulse responses would then be given by rows 1 through n and columns 1 through (nh) of $\hat{\boldsymbol{\Psi}}$ and standard errors are provided directly from the regression output. Further simplification is available due to the special structure of the variance-covariance matrix $\boldsymbol{\Sigma}$, which allows GLS estimation of the system block by block.

In fact, ML estimation of (13) delivers asymptotically exact formulas for single and joint inference on the impulse response coefficients of the implied VAR, rather than the usual pointwise, analytic, delta-method approximations (see Hamilton, 1994, Ch. 11), or simulation-based estimates based on Monte Carlo or bootstrap replications.³ In general the true DGP is

³ Sims and Tao Zha (1999) provide methods for joint inference in impulse responses but they involve complicated and rather computationally intensive Bayesian methods.

unknown, as is the specific structure of Φ ; hence the GLS restrictions described above are unavailable. This poses no difficulty, however, as the error terms \mathbf{u}_{t+s}^s in expression (13) will follow some form of moving-average structure whose order is a function of the horizon s . Thus, impulse responses can be calculated by univariate regression methods with a heteroskedasticity and autocorrelation (HAC) robust estimator, with little loss of efficiency. In principle, the efficiency of these estimators can be improved upon by recursively including the residuals of the stage $s - 1$ local projection as regressors in the stage s local projection—an improvement whose details are reserved for another paper.

In practice the DGP is unknown and it is preferable to make as few assumptions as possible on its specification. Thus valid inference for local projection impulse responses can be obtained with HAC robust standard errors. For example, let $\hat{\Sigma}_L$ be the estimated HAC variance-covariance matrix of the coefficients $\hat{\mathbf{B}}_1^s$ in expression (2); then a 95-percent confidence interval for each element of the impulse response at time s can be constructed approximately as $1.96 \pm (\mathbf{d}_i' \hat{\Sigma}_L \mathbf{d}_i)^{1/2}$. Monte Carlo experiments in Section III suggest that even when the true underlying model is a VAR, unrestricted local projections experience small efficiency losses.

C. Comparison with Recent Impulse Response Estimators

Pao-Li Chang and Shinichi Sakata (2002), John H. Cochrane and Monika Piazzesi (2002), and Aditi Thapar (2002) recently introduced impulse response estimators that proceed in two stages: in the first stage a forecast-error series, \hat{v}_t , is created, which is then used in a second stage regression involving the original data y_t .⁴

Chang and Sakata (2002) calculate \hat{v}_t with an autoregression, Cochrane and Piazzesi (2002) with forecast errors implied by financial prices, and Thapar (2002) with errors in surveys of forecasts. Hence, all of these methods can be seen as a truncated version of Robert J. Barro's (1977, 1978) well-known regressions.

The major selling point is that the error series \hat{v}_t is "fundamental" in some sense. The argument is that because forecast errors are constructed from market-based (rather than econometric) expectations, all available information is appropriately incorporated and, in addition, one can dispense with the thorny issue of identification. These two features make these methods attractive.

There are some trade-offs to be considered, however. In general, it is perilous to disassociate the series of "shocks" from the model that generated them, especially in a multivariate context. The Wold decomposition theorem (see Peter J. Brockwell and Richard A. Davis, 1991) ensures that any covariance-stationary process can be expressed as an infinite moving average of forecast errors that are optimal in the mean-square sense. It does not guarantee, however, that these "shocks" are structural in the sense of representing the residual series that describes the DGP.

Additionally, market-based expectations are available for a limited number of variables. Econometrically, except for Thapar (2002), the second stage regression includes moving-average terms involving information dated $t - 1$, $t - 2$, ... which is problematic for consistency. (To see this, substitute the Wold decomposition of y_t into the second stage regressions.) Finally, it is difficult to produce correct inference as the second stage uses generated regressors, thus requiring bootstrap methods.

Impulse responses characterize the partial derivatives between different elements in \mathbf{y}_t over time in the multidimensional process that relates \mathbf{y}_t to its past. Thus, while small variations in the specification of this multidimensional process may do little to alter the "slopes" that measure such trade-offs, they may well generate residual series that are relatively uncorrelated with each other. A similar point was raised by Sims (1998) in response to a critique of VARs by Glenn D. Rudebusch (1998).

This argument can be underscored by an additional observation, that while it is perfectly coherent to think of impulse responses in the context of a nonlinear, non-Gaussian model for \mathbf{y}_t (such as when the data are transition data), there may not always be a natural series of "shocks" that can be manufactured for such a

⁴ The ensuing discussion is in the univariate context, hence the lowercase notation.

model. On the other hand, it is not conceptually difficult to see that one could obtain the impulse responses by computing the sequence of first-order marginal effects in models that seek to explain \mathbf{y}_{t+s} as a function of information dated $t - 1$ and beyond.

II. Flexible Local Projections

Linear models, such as VARs, bestow four restrictive properties on their implied impulse responses:⁵ (1) *symmetry*, where responses to positive and negative shocks are mirror images of each other; (2) *shape invariance*, where responses to shocks of different magnitudes are scaled versions of one another; (3) *history independence*, where the shape of the responses is independent of the local conditional history; and (4) *multidimensionality*, where responses are high-dimensional nonlinear functions of parameter estimates which complicate the calculation of standard errors and quickly compound misspecification errors. For example, there is no reason to expect that the output losses due to higher interest rates will be equivalent to the output gains when interest rates are lowered; that the output losses will simply double when interest rates double as well; or that the same increase in interest rates will have the same effect on output whether we are coming out of a recession or just plunging into one.

Although local-linear projection methods dispense with the fourth of these problems, they are indeed linear and thus constrained by properties (1)–(3). In a traditional multivariate, model-based setting, investigation of nonlinearities is limited by at least three considerations: (1) the ability to estimate jointly a nonlinear system of equations with its inherent computational difficulties; (2) the complexity in generating multiple-step ahead forecasts from a multivariate nonlinear model (which, at a minimum, requires simulation methods since there are no closed forms available); and (3) the complication in computing appropriate standard errors for multiple-step ahead forecasts, and thus the impulse responses. Hence, it is natural to explore alternatives based on local projections.

Under mild assumptions, a nonlinear time series process \mathbf{y}_t can be expressed as a generic function of past values of a white noise process \mathbf{v}_t in the form

$$\mathbf{y}_t = \Phi(\mathbf{v}_t, \mathbf{v}_{t-1}, \mathbf{v}_{t-2}, \dots).$$

Assuming $\Phi(\cdot)$ is sufficiently well behaved, so that it can be approximated by a Taylor series expansion around some fixed point, say $\mathbf{0} = (0, 0, 0, \dots)$, then the closest equivalent to the Wold representation in nonlinear time series is the Volterra series expansion (see Maurice B. Priestley, 1988),

$$(15) \quad \mathbf{y}_t = \sum_{i=0}^{\infty} \Phi_i \mathbf{v}_{t-i} + \sum_{i=0}^{\infty} \sum_{j=0}^{\infty} \Phi_{ij} \mathbf{v}_{t-i} \mathbf{v}_{t-j} + \sum_{i=0}^{\infty} \sum_{j=0}^{\infty} \sum_{k=0}^{\infty} \Phi_{ijk} \mathbf{v}_{t-i} \mathbf{v}_{t-j} \mathbf{v}_{t-k} + \dots$$

which is a polynomial extension of the Wold decomposition in expression (9) with the constant omitted for simplicity. Similarly, consider extending the local projections in expression (2) with polynomial terms on \mathbf{y}_{t-1} :⁶

$$(16) \quad \begin{aligned} \mathbf{y}_{t+s} = & \boldsymbol{\alpha}^s + \mathbf{B}_1^{s+1} \mathbf{y}_{t-1} + \mathbf{Q}_1^{s+1} \mathbf{y}_{t-1}^2 + \mathbf{C}_1^{s+1} \mathbf{y}_{t-1}^3 \\ & + \mathbf{B}_2^{s+1} \mathbf{y}_{t-2} + \dots + \mathbf{B}_p^{s+1} \mathbf{y}_{t-p} + \mathbf{u}_{t+s}^s \end{aligned}$$

$$s = 0, 1, 2, \dots, h$$

where I do not allow for cross-product terms so that $\mathbf{y}_{t-1}^2 = (y_{1,t-1}^2, y_{2,t-1}^2, \dots, y_{n,t-1}^2)'$, as a matter of choice and parsimony rather than as a

⁵ For a detailed discussion, see Koop et al. (1996).

⁶ Since the impulse response coefficients involve the terms \mathbf{y}_{t-1} only, it is more parsimonious to restrict nonlinearities to these terms alone. In practice, if degrees of freedom are not a consideration, they can be extended to the remaining regressors, although the gain of doing so is probably small.

requirement. It is readily apparent that the impulse response at time s now becomes

(17)

$$\begin{aligned} IR(t, s, \mathbf{d}_i) &= \{\hat{\mathbf{B}}_1^s(\mathbf{y}_{t-1} + \mathbf{d}_i) + \hat{\mathbf{Q}}_1^s(\mathbf{y}_{t-1} + \mathbf{d}_i)^2 \\ &\quad + \hat{\mathbf{C}}_1^s(\mathbf{y}_{t-1} + \mathbf{d}_i)^3\} - \{\hat{\mathbf{B}}_1^s \mathbf{y}_{t-1} + \hat{\mathbf{Q}}_1^s(\mathbf{y}_{t-1})^2 \\ &\quad + \hat{\mathbf{C}}_1^s(\mathbf{y}_{t-1})^3\} \\ &= \{\hat{\mathbf{B}}_1^s \mathbf{d}_i + \hat{\mathbf{Q}}_1^s(2\mathbf{y}_{t-1}\mathbf{d}_i + \mathbf{d}_i^2) \\ &\quad + \hat{\mathbf{C}}_1^s(3\mathbf{y}_{t-1}^2\mathbf{d}_i + 3\mathbf{y}_{t-1}\mathbf{d}_i^2 + \mathbf{d}_i^3)\} \end{aligned}$$

$$s = 0, 1, 2, \dots, h$$

and with the obvious normalizations, $\mathbf{B}_1^0 = \mathbf{I}$, $\mathbf{Q}_1^0 = \mathbf{0}_n$, and $\mathbf{C}_1^0 = \mathbf{0}_n$. These nonlinear estimates can be easily calculated by least squares, equation by equation, with any conventional econometric software. When some of the terms \mathbf{Q}_i^s and \mathbf{C}_i^s are non-zero, the impulse response function will vary according to the sign and with the size of the experimental shock defined by \mathbf{d}_i , thus dispensing with the symmetry and shape invariance restrictions. In addition, the impulse response depends on the local history \mathbf{y}_{t-1} at which it is evaluated. In particular, impulse responses comparable to local-linear or VAR-based impulse responses can be achieved by evaluation at the sample mean, i.e., $\mathbf{y}_{t-1} = \bar{\mathbf{y}}_{t-1}$. Different responses will be obtained if a different experimental value for \mathbf{y}_{t-1} is chosen and one can consider a 3-D plot of the impulse response for a range of values for \mathbf{y}_{t-1} .⁷ Finally, the 95-percent confidence interval for the cubic approximation in expression (16) can be easily calculated. Define the scaling $\boldsymbol{\lambda}_i \equiv (\mathbf{d}_i, 2\mathbf{y}_{t-1}\mathbf{d}_i + \mathbf{d}_i^2, 3\mathbf{y}_{t-1}^2\mathbf{d}_i + 3\mathbf{y}_{t-1}\mathbf{d}_i^2 + \mathbf{d}_i^3)'$ and denote $\hat{\boldsymbol{\Sigma}}_C$ the HAC, variance-covariance matrix of the coefficients $\hat{\mathbf{B}}_1^s, \hat{\mathbf{Q}}_1^s$, and $\hat{\mathbf{C}}_1^s$ in (16). Then, a 95-percent confidence interval for the impulse response at time s is approximately $1.96 \pm (\boldsymbol{\lambda}_i' \hat{\boldsymbol{\Sigma}}_C \boldsymbol{\lambda}_i)$.

Natural extensions of this principle would consist in formulating a flexible specification for the terms \mathbf{y}_{t-1} in expression (2), that is,

$$\mathbf{y}_{t+s} = m^s(\mathbf{y}_{t-1}; \mathbf{X}_{t-1}) + \mathbf{u}_{t+s} \quad s = 0, 1, 2, \dots, h$$

where $m^s(\cdot)$ may include any parametric, semi-parametric, and non-parametric approximation, and for which there is a rather extensive list of possible specifications to choose from. Monte Carlo experiments in Section III show some of the benefits of the local-cubic projection example just discussed, while the application in Section IV shows how to compute impulse responses based on polynomial projections with threshold effects.

III. Monte Carlo Evidence

This section contains two main simulations that evaluate the performance of local projections for impulse response estimation and inference. The first experiment is based on a standard monetary VAR that appears in Lawrence J. Christiano et al. (1996) and Charles L. Evans and David A. Marshall (1998), among many other papers. The experiment illustrates that local projections deliver impulse responses that are robust to lag length misspecification, consistent, and only mildly inefficient relative to the responses from the true DGP. The second experiment simulates a SVAR-GARCH (see Jordà and Kevin D. Salyer, 2003) to show that flexible local projections do a reasonable job at approximating the inherent nonlinearities of this model, and compares its performance relative to a Bayesian VAR with time-varying parameters and volatilities—a natural flexible alternative to conventional VARs.

A. Consistency and Efficiency

This Monte Carlo simulation is based on monthly data from January 1960 to February 2001 (494 observations). First, I estimate a VAR of order 12 on the following variables: *EM*, log of non-agricultural payroll employment; *P*, log of personal consumption expenditures deflator (1996 = 100); *PCOM*, annual growth rate of the index of sensitive materials prices issued by the Conference Board; *FF*, federal funds rate; *NBRX*, ratio of nonborrowed

⁷ Potter (2000) contains a detailed and more formal discussion of alternative ways of defining and reporting nonlinear impulse responses in general.

reserves plus extended credit to total reserves; and $\Delta M2$, annual growth rate of M2 stock. I then save the coefficient estimates from this VAR and simulate 500 series of 494 observations using multivariate normal residuals and the variance-covariance matrix from the estimation stage, and use the first 12 observations from the data to initialize all 500 runs. Information criteria based on the original data suggest the lag-length to be 12 when using Hirotugu Akaike's AIC and Clifford Hurvich and Chih-Ling Tsai's⁸ AIC_c , or two when using Gideon Schwarz's SIC . These choices are very consistent across the 500 simulated runs.⁹

The first experiment compares the impulse responses that would result from fitting a VAR of order two (as SIC would suggest) with local-linear and -cubic projections of order two as well. Although a reduction from 12 to 2 lags may appear severe, this is a very mild form misspecification in practice. The results are displayed graphically in Figure 1 rather than reporting tables of root mean-squared errors, which are less illuminating. Each panel in Figure 1 displays the impulse response of a variable in the VAR due to a shock in the variable FF ,¹⁰ calculated as follows: the thick-solid line is the true VAR(12) impulse response with two standard-error bands displayed in thick-dashed lines (these are based on the Monte Carlo simulations of the true model). The responses based on a VAR(2) are displayed by the line with squares; the responses from the local linear approximation are displayed by the dashed line; and the responses from the cubic local approximation are displayed by the line with circles.

Several results deserve comment. The VAR(2) responses often fall within the two standard-error bands of the true response and have the same general shape. This supports the observa-

tion that the VAR(2) is only mildly misspecified. However, both the local-linear and -cubic projections are much more accurate at capturing detailed patterns of the true impulse response over time, even at medium and long horizons.

In one case, the departure from the true impulse response was economically meaningful: the response of the variable P . The response based on the VAR(2) is statistically different from the true response for the first 17 periods and suggests that prices increase in response to an increase in the federal funds rate over 23 out of the 24 periods displayed. Many researchers have previously encountered this type of counterintuitive result and dubbed it the "price puzzle." Sims (1992) suggested this behavior is probably related to unresolved endogeneity issues and proposes including a materials price index, as it is done here with $PCOM$. In contrast, the local-linear projection is virtually within the true two standard error bands throughout the 24 periods depicted, and is strictly negative for the last 7 periods.

The second experiment shows that local projection methods are consistent under true specification by calculating impulse responses with up to 12 lags. The results are reported in Figure 2, also for a shock to FF only. Thus, the thick line is the true impulse response, along with two standard error bands displayed in thick-dashed lines. The responses based on local linear projections are displayed with the dashed line and the responses based on local cubic projections are displayed by the line with circles. Generally, the responses by either approximation literally lie on top of the true response¹¹ with occasional minor differences that disappeared with slightly bigger samples, not reported here.

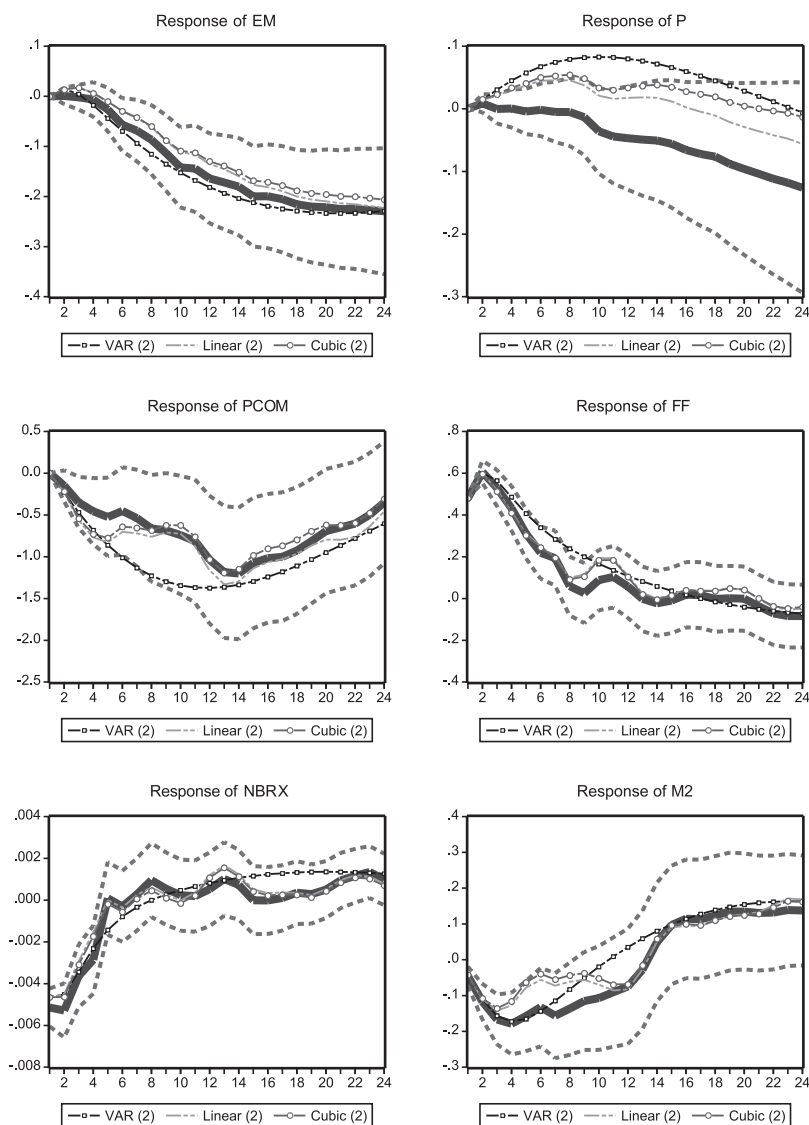
The final set of experiments evaluates the standard error estimates of the impulse response coefficients (which are commonly used to display error bands around impulse responses). In order to stack the odds against local projection methods and because in practice we never know the true multivariate DGP describing the data, I consider standard errors calculated from

⁸ Hurvich and Tsai (1993) provide a correction to AIC specifically designed for VARs and with superior properties to either AIC or SIC .

⁹ Although the true DGP contains 12 lags, the coefficients used in the Monte Carlo are based on the estimated VAR and it is plausible that many of these coefficients are not significantly different from zero in practice.

¹⁰ Responses to shocks in all the variables are available upon request and are not reported here in the interest of space.

¹¹ This is also true for the responses to all the remaining shocks that are not reported here but are available upon request.

FIGURE 1. IMPULSE RESPONSES TO A SHOCK IN *FF*. LAG LENGTH: 2

Notes: Evans and Marshall (1998) VAR(12) Monte Carlo Experiment. The thick line is the true impulse response based on a VAR(12). The thick dashed lines are Monte Carlo two standard error bands. Three additional impulse responses are compared, based on estimates involving two lags only: (1) the response calculated by fitting a VAR(2) instead, depicted by the line with squares; (2) the response calculated with a local-linear projection, depicted by the dashed line; and (3) the response calculated with a local-cubic projection, depicted by the line with circles. 500 replications.

univariate projections, equation by equation. Specifically, I generated 500 runs of the original series and then fitted a VAR(12) and local-

linear and -cubic projections with 12 lags as well. Then I computed Monte Carlo standard errors for the VAR(12) to give a measure of the

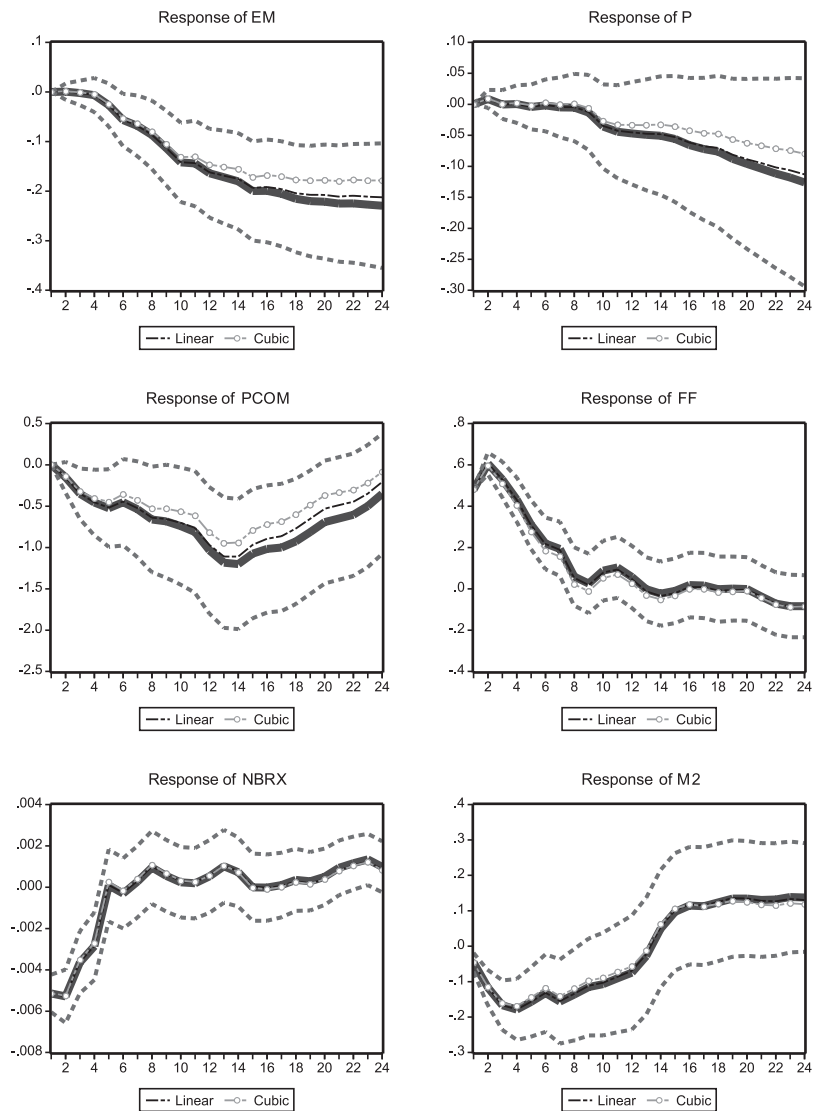


FIGURE 2. IMPULSE RESPONSES TO A SHOCK IN *FF*. LAG LENGTH: 12

Notes: Evans and Marshall (1998) VAR(12) Monte Carlo Experiment. The thick line is the true impulse response based on a VAR(12). The thick dashed lines are Monte Carlo two standard error bands. Two additional impulse responses are compared: (1) the response calculated with a local-linear projection with 12 lags, depicted by the dashed line; and (2) the response calculated with a local-cubic projection, depicted by line with circles. 500 replications.

true standard errors, and calculated Newey-West¹² corrected standard errors for the local

¹² The Newey-West lag correction is selected to increase with *s*, the horizon of the impulse response being considered.

projections. Table 1 reports these results for each variable in response to a shock in *FF* as well. In Section I, I argued that local projection estimates of impulse responses are less efficient than VAR-based estimates when the VAR is correctly specified and it is the true model.

TABLE 1—STANDARD ERRORS FOR IMPULSE RESPONSES

<i>s</i>	EM			P			PCOM			FF			NBRX			ΔM2		
	True-MC	Newey-West (Linear)	Newey-West (Cubic)	True-MC	Newey-West (Linear)	Newey-West (Cubic)	True-MC	Newey-West (Linear)	Newey-West (Cubic)	True-MC	Newey-West (Linear)	Newey-West (Cubic)	True-MC	Newey-West (Linear)	Newey-West (Cubic)	True-MC	Newey-West (Linear)	Newey-West (Cubic)
1	0.000	0.007	0.008	0.000	0.007	0.007	0.000	0.089	0.096	0.000	0.022	0.024	0.0005	0.0005	0.0005	0.014	0.012	0.014
2	0.008	0.011	0.012	0.007	0.010	0.011	0.094	0.146	0.161	0.027	0.036	0.041	0.0007	0.0006	0.0007	0.025	0.023	0.026
3	0.013	0.015	0.016	0.012	0.014	0.015	0.155	0.191	0.212	0.044	0.046	0.052	0.0008	0.0007	0.0008	0.035	0.032	0.035
4	0.018	0.019	0.021	0.015	0.017	0.018	0.202	0.224	0.250	0.054	0.053	0.060	0.0008	0.0008	0.0009	0.044	0.039	0.043
5	0.022	0.023	0.025	0.018	0.020	0.022	0.240	0.255	0.284	0.061	0.058	0.065	0.0009	0.0008	0.0009	0.050	0.045	0.050
6	0.027	0.026	0.030	0.021	0.023	0.025	0.267	0.279	0.311	0.064	0.062	0.069	0.0009	0.0008	0.0009	0.056	0.050	0.056
7	0.031	0.030	0.033	0.025	0.026	0.029	0.296	0.301	0.335	0.067	0.064	0.072	0.0009	0.0008	0.0009	0.061	0.056	0.062
8	0.035	0.033	0.037	0.028	0.029	0.032	0.325	0.322	0.357	0.072	0.066	0.074	0.0009	0.0008	0.0009	0.066	0.060	0.067
9	0.038	0.036	0.040	0.031	0.032	0.035	0.350	0.340	0.376	0.073	0.067	0.075	0.0009	0.0009	0.0010	0.070	0.064	0.072
10	0.041	0.039	0.043	0.035	0.035	0.039	0.361	0.356	0.392	0.074	0.069	0.077	0.0009	0.0009	0.0010	0.074	0.069	0.076
11	0.044	0.042	0.046	0.038	0.038	0.042	0.377	0.371	0.407	0.075	0.072	0.080	0.0009	0.0009	0.0010	0.078	0.073	0.081
12	0.046	0.044	0.048	0.042	0.042	0.045	0.390	0.380	0.416	0.077	0.075	0.083	0.0009	0.0009	0.0010	0.082	0.077	0.085
13	0.048	0.046	0.050	0.046	0.045	0.049	0.402	0.385	0.423	0.079	0.078	0.087	0.0009	0.0009	0.0010	0.084	0.080	0.088
14	0.050	0.048	0.053	0.049	0.048	0.052	0.402	0.389	0.427	0.079	0.080	0.089	0.0009	0.0009	0.0010	0.085	0.082	0.090
15	0.051	0.050	0.055	0.052	0.052	0.056	0.399	0.392	0.430	0.080	0.082	0.090	0.0008	0.0009	0.0010	0.084	0.084	0.092
16	0.053	0.052	0.057	0.055	0.055	0.059	0.393	0.394	0.434	0.080	0.083	0.091	0.0008	0.0009	0.0010	0.085	0.085	0.093
17	0.054	0.054	0.058	0.059	0.058	0.063	0.393	0.396	0.437	0.081	0.084	0.092	0.0008	0.0009	0.0010	0.085	0.086	0.094
18	0.055	0.055	0.060	0.062	0.062	0.066	0.386	0.399	0.441	0.081	0.084	0.093	0.0008	0.0009	0.0010	0.085	0.087	0.095
19	0.057	0.057	0.061	0.066	0.065	0.070	0.381	0.402	0.444	0.079	0.085	0.093	0.0007	0.0009	0.0010	0.084	0.088	0.096
20	0.059	0.058	0.062	0.070	0.068	0.073	0.380	0.405	0.448	0.079	0.086	0.093	0.0007	0.0009	0.0010	0.083	0.088	0.096
21	0.060	0.059	0.064	0.074	0.071	0.076	0.378	0.409	0.453	0.077	0.086	0.094	0.0007	0.0009	0.0010	0.082	0.088	0.096
22	0.061	0.061	0.065	0.078	0.075	0.080	0.377	0.415	0.462	0.077	0.087	0.094	0.0007	0.0009	0.0010	0.081	0.088	0.096
23	0.063	0.062	0.066	0.082	0.078	0.083	0.377	0.423	0.472	0.077	0.087	0.095	0.0006	0.0009	0.0010	0.080	0.088	0.096
24	0.064	0.063	0.068	0.086	0.081	0.086	0.371	0.431	0.484	0.077	0.087	0.095	0.0006	0.0009	0.0010	0.078	0.088	0.096

Notes: True-MC refers to the Monte Carlo (500 replications) standard errors for the impulse response coefficients due to a shock in *FF* in a VAR(12) with the variables *EM*, *P*, *PCOM*, *FF*, *NBRX*, *ΔM2*. Similarly, Newey-West (linear) refers to standard errors calculated from local-linear projections and their Newey-West corrected standard errors, while Newey-West (cubic) refers to the local-cubic projections instead.

Table 1 confirms this statement but also shows that this loss of efficiency is not particularly big. The Newey-West corrected standard errors based on single equation estimates of the local linear projections are virtually identical to the Monte Carlo standard errors from the VAR, particularly for the variables *EM* and *P*. The biggest discrepancy is for the variable *NBRX*, because the VAR Monte Carlo standard errors actually *decline* as the horizon increases (specially after the fourteenth period). This anomaly, which is explained in Sims and Zha (1999), is not a feature of the local projection standard errors, which incorporate the additional uncertainty existing in long-horizon forecasts. Altogether, these results suggest that the efficiency losses are rather minor, even for a system that contains as many as 6 variables, 12 lags, and horizons of 24 periods.

B. Impulse Responses and Nonlinearities

The following Monte Carlo experiment compares impulse responses calculated by local pro-

jection methods with a traditional and a flexibly parametrized VAR when the DGP is nonlinear. The specific DGP for this experiment is based on the SVAR-GARCH model in Jordà and Salyer (2003), which is a multivariate version of a traditional GARCH-M model. Here, I experiment with the following specification:

(18)
$$\begin{bmatrix} y_{1t} \\ y_{2t} \\ y_{3t} \end{bmatrix} = \mathbf{A} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \\ y_{3,t-1} \end{bmatrix} + \mathbf{B}h_{1t} + \begin{bmatrix} \sqrt{h_{1t}}\varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix},$$

$$\varepsilon_t \sim N(0, \mathbf{I}_3)$$

$$h_{1t} = 0.5 + 0.3u_{1,t-1} + 0.5h_{1,t-1};$$

$$u_{1t} = \sqrt{h_{1t}}\varepsilon_{1t}$$

$$\mathbf{A} = \begin{bmatrix} 0.5 & -0.25 & 0.25 \\ 0.75 & 0.25 & 0.25 \\ -0.25 & -0.25 & 0.75 \end{bmatrix}; \quad \mathbf{B} = \begin{bmatrix} -1.75 \\ -1.5 \\ 1.75 \end{bmatrix}$$

and a sample size of 300, replicated 500 times. This DGP is advantageous for several reasons. First, the SVAR-GARCH nests a linear VAR(1), and in fact impulse responses to shocks to ε_{2t} or ε_{3t} , or to “small” shocks to ε_{1t} are equivalent in both models. Discrepancies arise with larger shocks to ε_{1t} since there is a revision of their conditional variance (due to the GARCH term) that affects the conditional mean and makes the responses more nonlinear. Second, since I also specify a time-varying parameter/volatility VAR¹³ (TVPVAR) as Cogley and Sargent (2001) as a flexible approximator to the DGP, it is useful that the nonlinearity be of a smooth nature (say, relative to a model with structural breaks or switching-regimes). Notice that the DGP will have time-varying volatility with some effects on the conditional mean and one would expect that the TVPVAR is well suited to capture these features.

As a foil to the cubic projection, the TVPVAR is estimated with Bayesian methods for each of the 500 Monte Carlo replications using the first 100 observations to calibrate the prior, leaving the remaining 200 for inference. The estimator is based on a Gibbs-sampler initialized with 2,000 draws and allowed to run for an additional 5,000 iterations to ensure convergence. This produces a history of 200 observations for each estimated parameter in the model. To calculate the impulse responses, I select the quintiles of the distribution of the residual for the first equation (the one with GARCH effects) which identify five dates from the last 200 observations in the sample (the ones with time-varying parameters). This allows the TVPVAR to tailor the impulse responses to different values of the conditional variance and to better capture any resulting nonlinearities.¹⁴

¹³ I thank Tim Cogley for all his advice on the numerous intricacies of this model and Massimiliano de Santis for his invaluable assistance in estimating the model with his GAUSS code. For further details on the specification and estimation of the model, the reader is referred to Cogley and Sargent (2001, 2003). The GAUSS code for estimating the time-varying parameter VAR can be obtained by e-mailing Massimiliano de Santis directly at: mdesantis@ucdavis.edu.

¹⁴ A provision in the code discards any Monte Carlo draws for which the stationarity condition for the distribution of the parameters is violated. If a draw is discarded, the Monte Carlo runs for an additional draw. In the end, 5 to 10 percent of the draws had to be replaced.

Calculating impulse responses for each of these five selected dates requires an additional Monte Carlo simulation since the parameters of the model are varying over time stochastically. Hence, I generate 100 sequences of 1–8-step ahead forecasts, conditional on the parameter values at each of the five dates previously selected and the driving processes estimated from the data. The average over these 100 histories is used to produce the impulse responses.¹⁵

Figure 3 displays the impulse responses from a shock to ε_{1t} of unit in size.¹⁶ The thick solid lines in each graph represent the true impulse responses with and without GARCH effects (i.e., $\mathbf{B} = \mathbf{0}$), the less variable of the two representing the latter case. Indistinguishable from the impulse responses generated when the GARCH effects are switched off, both the linear VAR(1) and the linear projection responses are displayed by thin dashed lines. Finally, the thick dashed line with crosses displays the cubic projection responses, whereas the thick line with squares displays the TVPVAR responses, averaged over the five selected days. (It will become clear momentarily why the averaging.) Standard errors are omitted from the figure to improve clarity. Suffice it to say that conventional error bands are very narrow and clearly separate impulse responses from the DGP with and without GARCH effects, except at crossing points.

Several results deserve comment. The VAR(1), the linear projections, and the cubic projections evaluated at the sample mean (not reported) precisely capture the shape of the impulse responses from the DGP without GARCH effects, even though these are estimated from a sample generated without this constraint. The true impulse responses with GARCH effects are far more variable, and to capture this feature I consider cubic projections evaluated at five standard deviations away from the mean and responses from the TVPVAR evaluated at the five dates selected previously. In the end, the TVPVAR responses displayed no variability for the first six to seven periods. After that, they fan

¹⁵ The complete Monte Carlo took nine days, two hours, and 17 minutes on a SUN Sunfire server with eight 900 Mhz processors and 16GB of RAM memory.

¹⁶ Shocks to ε_{2t} and ε_{3t} would simply produce the usual linear VAR responses.

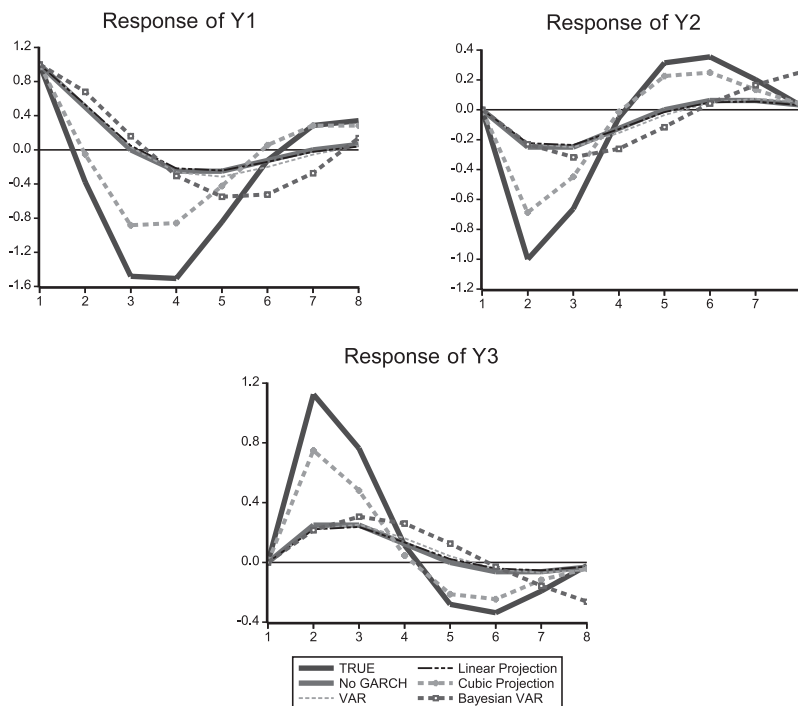


FIGURE 3. IMPULSE RESPONSES TO A SHOCK IN Y_1 FROM A SVAR-GARCH

Notes: The thick solid lines describe the true impulse response in the SVAR-GARCH model with and without GARCH effects (i.e., $B = 0_3$), the less variable referring to the latter. The thin dashed lines are the responses from a VAR(1) and from local-linear projections. The thick dashed line with crosses is the local-cubic projection whereas the thick dashed line with squares is the impulse response from the Bayesian VAR.

out in different directions, much like the picture of a forecast confidence interval. Hence, to simplify the figure, I report the average over the five dates. As Figure 3 clearly shows, the TVPVAR responses were unable to capture the nonlinearities in the model, whereas the cubic projections provided a much closer fit to the true impulse responses. Overall, local polynomial projections seem to afford better control over smooth nonlinearities since they nest linearity and their complexity can be easily controlled.

IV. Application: Inflation-Output Trade-Offs

Pioneering work by Bennett T. McCallum (1983) and Taylor (1993) inspired a remarkable amount of research on the efficacy, optimality, credibility, and robustness of interest rate rules for monetary policy. The performance of can-

didate policy rules is often evaluated in the context of a simple, new-Keynesian, closed-economy model which, at a minimum, can be summarized by three fundamental expressions: an IS equation, a Phillips relation, and the candidate policy rule itself. While models may differ in their degree of micro-foundation and forward-looking behavior (see Taylor's [1999] edited volume for examples), they share the need to reproduce the fundamental dynamic properties of actual economies with some degree of accuracy.

Consequently, it is natural to investigate the dynamic properties of inflation, the output gap, and interest rates to provide a benchmark for competing theoretical models. The specific definitions of the variables I consider correspond to the definitions in Rudebusch and Lars E.O. Svensson (1999) and are relatively standard for

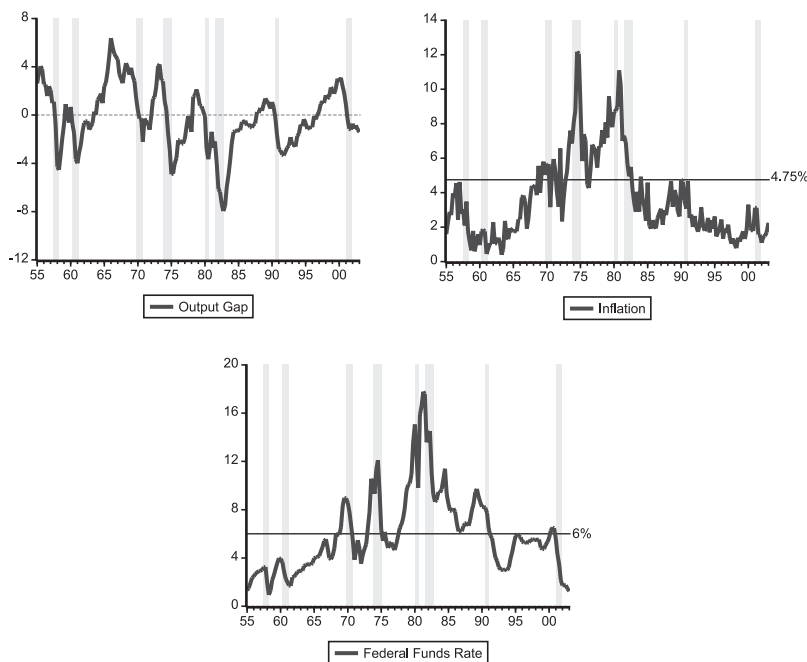


FIGURE 4. TIME SERIES PLOTS OF THE OUTPUT GAP, INFLATION, AND THE FEDERAL FUNDS RATE

Notes: All variables in annual percentage rates. Shaded areas indicate NBER-dated recessions. Output gap is defined as the percentage difference between real GDP and potential GDP (Congressional Budget Office); inflation is defined as the percentage change in the GDP, chain-weighted price index at annual rate; and the federal funds rate is the quarterly average of daily rates, in annual percentage rate. The solid horizontal lines display the thresholds detected by Hansen's (2000) test for inflation and the federal funds rate.

this literature: y_t is the percentage gap between real GDP and potential GDP (as measured by the Congressional Budget Office); π_t is quarterly inflation in the GDP, chain-weighted price index in percent at annual rate;¹⁷ and i_t is the quarterly average of the federal funds rate in percent at an annual rate. The sample of quarterly data runs over the period 1955:I–2003:I and is displayed in Figure 4.

A good starting point for the analysis is to calculate impulse responses with a VAR and local-linear and -cubic projections. The lag-length is determined by information criteria, allowing for a maximum lag-length of eight. Similar studies, such as Galí (1992) and Fuhrer

and Moore (1995a and 1995b), use four lags for variables analyzed in the levels. This selection is confirmed by AIC_c , while AIC suggests six lags and SIC suggests two lags. Therefore, Figure 5 displays the impulse responses based on a VAR(4) and local-linear and -cubic projections, all identified with a standard Cholesky decomposition¹⁸ and the Wold-causal order y_t, π_t , and i_t .

The VAR(4) responses are depicted with a thick line and the solid line with crosses, and the two accompanying dashed lines depict the responses from local-linear projections and the corresponding Newey-West corrected, two standard-error bands. The solid line with circles

¹⁷ I thank an anonymous referee for spotting that I had used the *quantity* index in the previous version of this paper.

¹⁸ This Cholesky ordering is consistent with the literature and facilitates replicability.

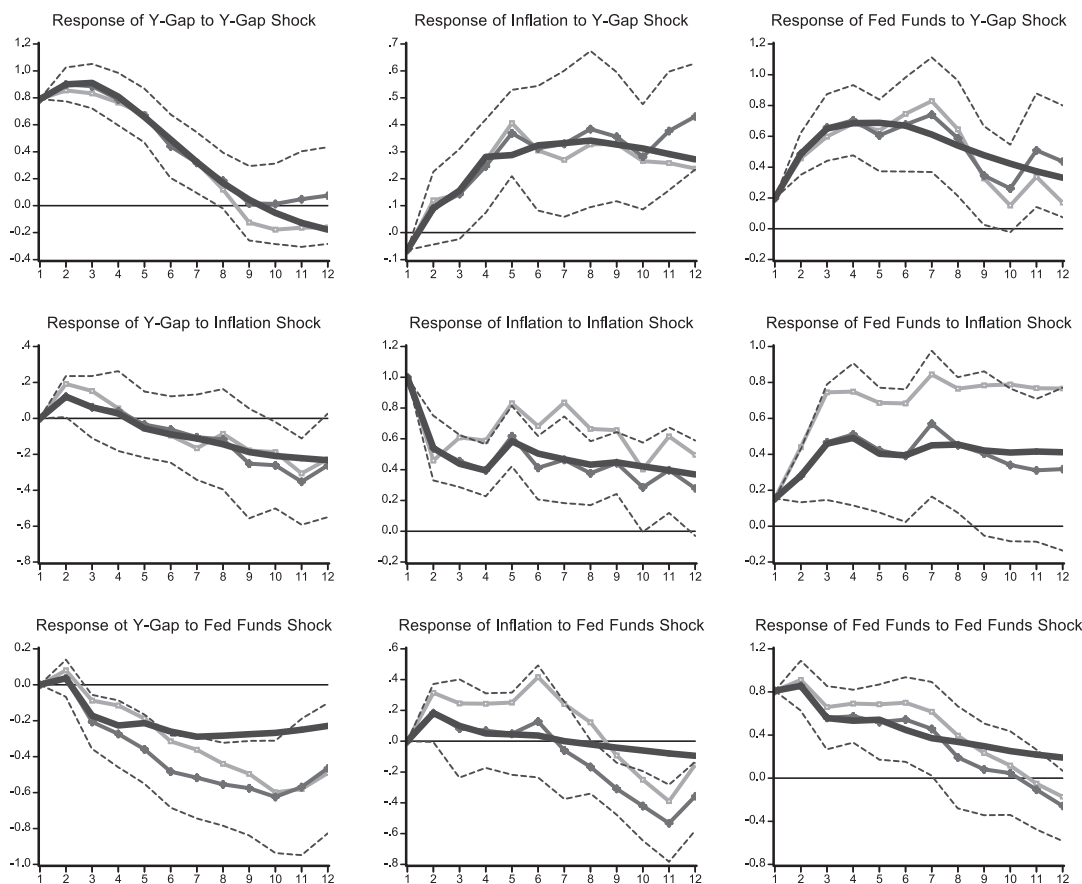


FIGURE 5. IMPULSE RESPONSES FOR THE NEW KEYNESIAN MODEL BASED ON A VAR, AND LINEAR AND CUBIC PROJECTIONS

Notes: The thick line is the response calculated from a VAR; the solid line with crosses is the response calculated by linear projection; the two dashed lines are 95-percent confidence level error bands for the individual coefficients of the linear projection response; and the solid line with circles is the response calculated by cubic projection evaluated at the sample mean. All responses calculated with four lags.

is the response from local-cubic projections evaluated at the sample mean. Each row represents the responses of y_t , π_t , and i_t to orthogonalized shocks, starting with y_t , π_t , and then i_t , all measured in percentages. Generally, there is broad correspondence among the responses calculated by the different methods, with a few exceptions.

The cubic projection responses show that inflation is considerably more persistent to its own shocks than what is reflected by the responses calculated by either linear method. Perhaps not surprisingly, the associated interest rate re-

sponse is also almost twice as aggressive (at 0.75 percent versus 0.4 percent) 12 quarters after impact. The responses of the system to interest rate shocks are perhaps more interesting from an economic point of view because they give us an idea of the relative output and inflation trade-offs in response to monetary policy. The VAR response of the output gap suggests a loss of output of 0.25 percent in response to a 0.8-percent increase in the federal funds rate, 12 quarters after impact. This loss is approximately half what linear and cubic projections predict (at around 0.5 percent). On the other hand, the

response of inflation to this increase in the Fed funds rate is mostly positive but not significantly different from zero. The linear projection is similar for the first seven quarters but is significantly negative thereafter, whereas the cubic projections show a more positive initial inflation response with a dramatic decline around quarter seven as well.

Based on this preliminary analysis, we investigate for further nonlinearities in the impulse responses. It seems of considerable importance to determine whether the inflation-output gap trade-offs that the monetary authority faces vary with the business cycle, or during periods of high inflation, or when interest rates are close to the zero bound, for example. Although the polynomial terms in local projections approximate smooth nonlinearities, they are less helpful in detecting the type of nonlinearity implicit in these examples. Therefore, I tested all linear projections¹⁹ for evidence of threshold effects due to all four lags of y_t , π_t , and i_t using Hansen’s (2000) test²⁰. For example, a typical regression is,

$$(19) \quad z_t = \boldsymbol{\rho}_L' \mathbf{X}_{t-1} + \varepsilon_t^L \quad \text{if } w_{t-j} \leq \delta$$
$$z_t = \boldsymbol{\rho}_H' \mathbf{X}_{t-1} + \varepsilon_t^H \quad \text{if } w_{t-j} > \delta$$

where z_t is respectively y_t, π_t , and i_t and w_{t-j} can be any of y_{t-j}, π_{t-j} , and $i_{t-j}, j \in \{1, 2, 3, 4\}$. \mathbf{X}_{t-1} collects lags 1 through 4 of the variables y_t, π_t , and i_t and $\boldsymbol{\rho}_k, k = L, H$ collects the coefficients and L stands for “low” and H stands for “high.” The test is an F-type test that sequentially searches for the optimal threshold δ and adjusts the corresponding distribution via 1,000 bootstrap replications.

Table 2 summarizes the results of these tests by reporting the estimated thresholds and p -values (in parenthesis) for all possible combinations of endogenous and threshold variables. Several results deserve comment. First, there are no “business-cycle” asymmetries associated with threshold effects in the output gap. Second,

TABLE 2—HANSEN’S (2000) TEST FOR THE PRESENCE OF THRESHOLD EFFECTS. THRESHOLD ESTIMATES AND BOOTSTRAP p -VALUES

Threshold variable	Dependent variable		
	Output gap (y_t)	Inflation (π_t)	Fed funds (i_t)
y_{t-1}	−0.85 (0.74)	−1.31 (0.62)	−0.09 (0.24)
y_{t-2}	−1.97 (0.73)	−2.07 (0.33)	−0.85 (0.33)
y_{t-3}	0.37 (0.20)	−1.42 (0.28)	−2.34 (0.24)
y_{t-4}	−1.20 (0.50)	−1.25 (0.18)	−2.09 (0.84)
π_{t-1}	4.68 (0.03)	4.00 (0.39)	4.93 (0.10)
π_{t-2}	4.66 (0.09)	4.54 (0.02)	4.24 (0.18)
π_{t-3}	3.91 (0.30)	5.31 (0.02)	4.24 (0.00)
π_{t-4}	2.82 (0.13)	3.25 (0.59)	3.98 (0.04)
i_{t-1}	5.94 (0.53)	6.52 (0.46)	7.88 (0.01)
i_{t-2}	6.02 (0.19)	5.94 (0.92)	5.56 (0.21)
i_{t-3}	6.27 (0.04)	8.16 (0.95)	5.82 (0.05)
i_{t-4}	5.64 (0.55)	5.28 (0.37)	5.09 (0.07)

Notes: The equation for each dependent variable contains four lags of each of the dependent variables in the system. The test is an LM-type test for the null hypothesis that there is no threshold effect. Each cell contains the estimate of the optimal threshold value estimate and a bootstrap-based p -value (in parenthesis) calculated with 1,000 draws and a 20-percent trimming value of the sample to allow for sufficient degrees of freedom. The test corrects for left-over heteroskedasticity. The results on this table were calculated with the GAUSS code that Bruce Hansen makes available on his Web site based on his 2000 Econometrica paper. Entries in bold and italic signify evidence of a threshold at the conventional 95-percent confidence level.

the null of linearity is rejected across equations for several lags of both inflation and the federal funds rate. Third, there is considerable correspondence between the estimated threshold values for the lags of a given variable across all equations. Fourth, the reported estimated threshold values correspond to the value that maximizes the likelihood. Note that when the null of linearity is rejected, however, it is often

¹⁹ I used the local linear projections for the test for parsimony although the final analysis is based on cubic projections.

²⁰ The GAUSS routines to perform the test are available directly from Bruce Hansen’s Web site (www.ssc.wisc.edu/~bhansen/progs/progs_threshold.html).

rejected for an interval around this optimal value.

Despite the apparent complexity of these results, the overall message that emerges is straightforward: the estimated thresholds are dividing the data into the turbulent period of the 1970s to mid-1980s (the “high-inflation” regime) and the rest of the sample (the “low-inflation” regime). Consequently, it is natural to consolidate these results by conducting two experiments. In the first experiment I allow for a threshold in the third lag of inflation at 4.75 percent. In the second, the threshold is in the third lag of the federal funds rate at 6 percent instead. Figure 4 displays these two thresholds in reference to the raw data to illustrate that the main difference is that the threshold in the federal funds rate extends the high-inflation regime up to the late 1980s.

Figure 6 compares the responses to a shock in the federal funds rate for these two experiments.²¹ In particular, the left column displays the graphs corresponding to the inflation threshold, while the right column displays the graphs for the federal funds rate threshold. The solid thick line and the dashed lines are the cubic projections evaluated at the sample mean and the corresponding Newey-West-corrected, two standard-error bands. The solid line with crosses corresponds to the low-inflation regime responses, whereas the solid line with circles represents the high-inflation regime responses. All experiments are normalized to a 0.8-percent shock in the federal funds rate to facilitate comparability. (This is a one standard-error shock which is the one most often reported in standard econometric packages.)

Figure 6 clearly shows that the nature of the inflation-output trade-offs varies quite substantially depending on regime but does not really depend on which variable is used as a threshold. Generally, inflation and output are far more responsive to interest rates in the low-inflation regime than in the high-inflation regime, even though the federal funds rate responds somewhat more aggressively in the latter.

This empirical application is illustrative in

several dimensions. Although the evidence is not definitive, these results support the view held by Cogley and Sargent (2001), among others, that the adverse inflation-unemployment outcomes of the 1970s were not the result of bad policy (as advocated by DeLong, 1997, and Romer and Romer, 2002) but rather the result of a changing economic environment. Perhaps one argument that could undermine these results would suggest that the Federal Reserve had become less credible during the 1970s, although it seems clear that it had not become any less vigilant (this is especially evident in the responses depicted in the right column and last row of Figure 6). The results in Figure 6 also suggest that the “prize puzzle” (the common finding in the VAR literature that inflation actually *increases* in response to an increase in interest rates) does not characterize the current economic environment. In fact, the current regime is characterized by rather effective responses of the output gap and inflation to an increase in interest rates, an observation with important implications in the design of contemporary optimal policy responses that are not unduly contractionary. Finally, notice that while we have estimated flexible impulse responses that allow for threshold effects, the entire analysis was conducted by means of simple least squares regressions—an ostensible simplification relative to any multivariate alternative based on a flexible nonlinear model.

V. Conclusion

The first-order Taylor series expansion of a function at a given point gives a reasonable approximation to the function in a neighborhood of that point. The more nonlinear the function, however, the more the quality of the approximation deteriorates as we move farther away from the original evaluation point. Similarly, a VAR linearly approximates the DGP to produce optimal, one-period ahead forecasts, but impulse responses are functions of forecasts at ever-increasing horizons for which a VAR may provide a poor approximation.

This paper shows that impulse responses can be calculated by a sequence of projections of the endogenous variables shifted forward in time

²¹ The responses to the remaining shocks are omitted for brevity but are available upon request.

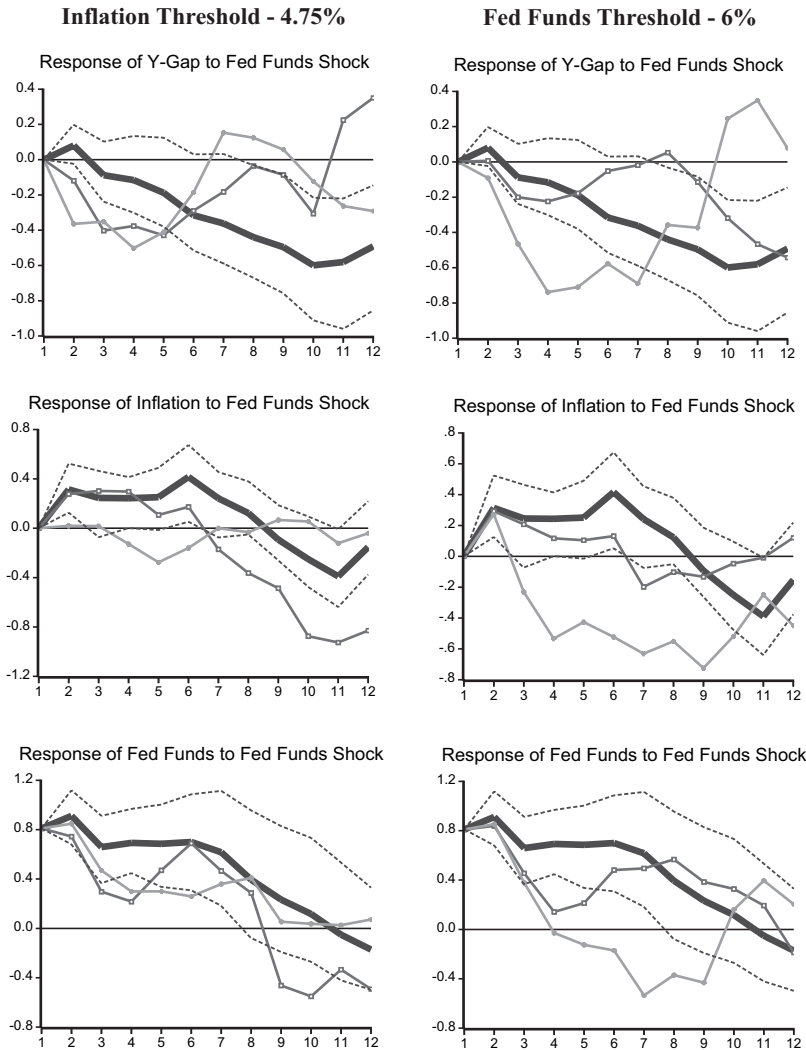


FIGURE 6. IMPULSE RESPONSES FROM NEW KEYNESIAN MODEL. CUBIC PROJECTIONS WITH THRESHOLD EFFECTS IN INFLATION AT 4.75 PERCENT VERSUS THE FEDERAL FUNDS RATE AT 6 PERCENT

Notes: The thick line is the response calculated by cubic projection at the sample mean; the dashed lines are two standard error bands for the individual coefficients of the cubic response; the solid line with crosses is the response by cubic projection below the threshold; and the solid line with circles is the response by cubic projection above the threshold.

onto its lags. Hence, these projections are local to each forecast horizon and therefore more robust to misspecification of the unknown DGP. Local projections are therefore a natural and preferable alternative to VARs when the object of interest is to calculate impulse responses.

Inference for impulse responses from VARs is difficult because impulse response coefficients are high-dimensional nonlinear functions of estimated parameters. By contrast, local projections directly estimate impulse response coefficients so that standard errors from traditional

HAC regression routines provide appropriate joint or point-wise inference.

The principles presented in this paper open a number of new avenues for research. The sequential nature of the local projections allow us to take advantage of the stage $s - 1$ forecast errors to improve inference in the stage s projections. Preliminary Monte Carlo evidence not reported here shows significant gains in using this procedure, whose formal derivations are left for a different paper. The same sequential feature of local projections can be used to improve structural identification, since any contemporaneous structure among the endogenous variables must remain as we shift time forward through each local projection.

Panel data applications in macroeconomics, where dynamics dominate cross-sectional considerations, are likely to become more prevalent. However, while the high dimensionality of VARs make impulse response estimation prohibitive in this context, local projections offer a natural and simple alternative for estimation and inference of the dynamics of different treatment effects.

Recent sophisticated solution methods have opened the doors to increasingly complex nonlinear economic models. It is often impractical to calculate impulse response functions from multivariate nonlinear models (for reasons explained in Section II) or simply impossible for non-Gaussian data whose multivariate density is unknown, yet impulse responses can still be calculated relatively simply by local projection methods.

Finally, local projection methods can be used to formalize the estimation of deep parameters in rational expectations models in the manner proposed in Julio J. Rotemberg and Michael Woodford (1997) and used in several papers thereafter (Christiano et al., 2005, Jeffrey D. Amato and Thomas Laubach, 2003, and so on). The technique consists of conjecturing a solution path represented by an infinite moving average (MA) and then matching the deep parameters of the model to the MA coefficients with the method of undetermined coefficients. A minimum distance estimator between data-based impulse responses and the theoretically constrained MA coefficients thus produces estimates of these deep parameters. In work in progress, Sharon Kozicki and I use local pro-

jections and optimal GMM-type weights to produce more efficient estimates and standard errors for a wide range of rational expectations models.

REFERENCES

- Amato, Jeffery D. and Laubach, Thomas.** "Estimation and Control of an Optimization-Based Model with Sticky Prices and Wages." *Journal of Economic Dynamics and Control*, 2003, 27(7), pp. 1181–1215.
- Barro, Robert J.** "Unanticipated Money Growth and Unemployment in the United States." *American Economic Review*, 1977, 67(2), pp. 101–15.
- Barro, Robert J.** "Unanticipated Money, Output, and the Price Level in the United States." *Journal of Political Economy*, 1978, 86(4), pp. 549–80.
- Bhansali, Rajendra J.** "Asymptotically Efficient Autoregressive Model Selection for Multistep Prediction." *Annals of the Institute of Statistical Mathematics*, 1996, 48(3), pp. 577–602.
- Bhansali, Rajendra J.** "Direct Autoregressive Predictors for Multistep Prediction: Order Selection and Performance Relative to the Plug-In Predictors." *Statistica Sinica*, 1997, 7(2), pp. 425–49.
- Bhansali, Rajendra J.** "Multi-Step Forecasting," in Michael P. Clements and David F. Hendry, eds., *A companion to economic forecasting*. Oxford: Blackwell Publishing, 2002, pp. 206–21.
- Brockwell, Peter J. and Davis, Richard A.** *Time series: Theory and methods*, 2nd ed. Berlin: Springer-Verlag, 1991.
- Chang, Pao-Li and Sakata, Shinichi.** "A Misspecification-Robust Impulse Response Estimator." Unpublished Paper, 2002.
- Christiano, Lawrence J.; Eichenbaum, Martin and Evans, Charles L.** "Identification and the Effects of Monetary Policy Shocks," in Mario I. Blejer, Zvi Eckstein, Zvi Hercowitz, and Leonardo Leiderman, eds., *Financial factors in economic stabilization and Growth*. Cambridge: Cambridge University Press, 1996, pp. 36–74.
- Christiano, Lawrence J.; Eichenbaum, Martin and Evans, Charles L.** "Nominal Rigidities

- and the Dynamic Effects of a Shock to Monetary Policy." *Journal of Political Economy*, 2005, 113(1), pp. 1–45.
- Cochrane, John H. and Piazzesi, Monika.** "The Fed and Interest Rates—A High-Frequency Identification." *American Economic Review*, 2002 (*Papers and Proceedings*), 92(2), pp. 90–95.
- Cogley, Timothy W. and Sargent, Thomas J.** "Evolving Post World War II U.S. Inflation Dynamics." in Ben S. Bernanke and Kenneth Rogoff, eds., *NBER macroeconomics annual*, Vol. 16. Cambridge: MIT Press, 2002, pp. 331–73.
- Cogley, Timothy W. and Sargent, Thomas J.** "Drifts and Volatilities: Monetary Policies and Outcomes in the Post WWII U.S." University of California, Davis, Department of Economics Working Paper: No. 2003–25, 2003.
- Cooley, Thomas F. and Dwyer, Mark.** "Business Cycle Analysis without Much Theory: A Look at Structural VARs." *Journal of Econometrics*, 1998, 83(1–2), pp. 57–88.
- Cox, David R.** "Prediction by Exponentially Weighted Moving Averages and Related Methods." *Journal of the Royal Statistical Society*, 1961, Series B, 23(2), pp. 414–22.
- Demiralp, Selva and Hoover, Kevin D.** "Searching for the Causal Structure of a Vector Autoregression." *Oxford Bulletin of Economics and Statistics*, 2003, 65(S1), pp. 745–67.
- DeLong, J. Bradford.** "America's Only Peacetime Inflation: The 1970's." in Christina Romer and David Romer, eds., *Reducing inflation: Motivation and strategy*. NBER Studies in Business Cycles, Vol. 30. Chicago: University of Chicago Press, 1997, Chapter 6.
- Evans, Charles L. and Marshall, David A.** "Monetary Policy and the Term Structure of Nominal Interest Rates: Evidence and Theory." *Carnegie-Rochester Conference Series on Public Policy*, 1998, 49(0), pp. 53–111.
- Fuhrer, Jeffrey C. and Moore, George R.** "Inflation Persistence." *Quarterly Journal of Economics*, 1995a, 110(1), pp. 127–59.
- Fuhrer, Jeffrey C. and Moore, George R.** "Monetary Policy Trade-Offs and the Correlation between Nominal Interest Rates and Real Output." *American Economic Review*, 1995b, 85(1), pp. 219–39.
- Galí, Jordi.** "How Well Does the IS-LM Model Fit Postwar U.S. Data?" *Quarterly Journal of Economics*, 1992, 107(2), pp. 709–38.
- Hamilton, James D.** *Time series analysis*. Princeton: Princeton University Press, 1994.
- Hansen, Bruce E.** "Sample Splitting and Threshold Estimation." *Econometrica*, 2000, 68(3), pp. 575–603.
- Hansen, Peter R.** "Granger's Representation Theorem: A Closed-Form Expression for I(1) Processes." University of California, San Diego, Department of Economics Discussion Paper: No. 2000–17, 2000.
- Hurvich, Clifford M. and Tsai, Chih-Ling.** "A Corrected Akaike Information Criterion for Vector Autoregressive Model Selection." *Journal of Time Series Analysis*, 1993, 14(3), pp. 271–79.
- Ing, Ching-Kang.** "Multistep Prediction in Autoregressive Processes." *Econometric Theory*, 2003, 19(2), pp. 254–79.
- Jordà, Òscar and Salyer, Kevin D.** "The Response of Term Rates to Monetary Policy Uncertainty." *Review of Economic Dynamics*, 2003, 6(4), pp. 941–62.
- Kim, Jinill; Kim, Sunghyun; Schaumburg, Ernst and Sims, Christopher A.** "Calculating and Using Second Order Accurate Solutions of Discrete Time Dynamic Equilibrium Models." Board of Governors of the Federal Reserve System (U.S.), Finance and Economics Discussion Series: 2003–61, 2003.
- Koop, Gary; Pesaran, M. Hashem and Potter, Simon M.** "Impulse Response Analysis in Nonlinear Multivariate Models." *Journal of Econometrics*, 1996, 74(1), pp. 119–47.
- Lin, Jin-Lung and Tsay, Ruey S.** "Co-Integration Constraint and Forecasting: An Empirical Examination." *Journal of Applied Econometrics*, 1996, 11(5), pp. 519–38.
- McCallum, Bennett T.** "Robustness Properties of a Rule for Monetary Policy: Reply." *Carnegie-Rochester Conference Series on Public Policy*, 1988, 29(0), pp. 213–14.
- Potter, Simon M.** "Nonlinear Impulse Response Functions." *Journal of Economic Dynamics and Control*, 2000, 24(10), pp. 1425–46.
- Priestley, Maurice B.** *Non-linear and non-stationary time series analysis*. London: Academic Press, 1988.
- Romer, Christina D. and Romer, David H.** "The

- Evolution of Economic Understanding and Postwar Stabilization Policy" in *Rethinking Stabilization Policy*, Federal Reserve Bank of Kansas City: Symposium Proceedings, August 29–31, 2000 Jackson Hole Conference, 2003, pp. 11–78.
- Rotemberg, Julio J. and Woodford, Michael.** "An Optimization-Based Econometric Framework for the Evaluation of Monetary Policy." In Ben S. Bernanke and Julio J. Rotemberg, eds., *NBER Macroeconomics Annual*. Cambridge: MIT Press, 1997, pp. 297–346.
- Rudebusch, Glenn D.** "Do Measures of Monetary Policy in a VAR Make Sense?" *International Economic Review*, 1998, 39(4), pp. 907–31.
- Rudebusch, Glenn D. and Svensson, Lars E. O.** "Policy Rule for Inflation Targeting," in John B. Taylor, ed., *Monetary policy rules*. NBER Research Studies in Business Cycles 1999. Chicago: University of Chicago Press, 1999, pp. 203–46.
- Sims, Christopher A.** "Macroeconomics and Reality." *Econometrica*, 1980, 48(1), pp. 1–48.
- Sims, Christopher A.** "Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy." *European Economic Review*, 1992, 36(5), pp. 975–1000.
- Sims, Christopher A.** "Do Measures of Monetary Policy in a VAR Make Sense? A Reply." *International Economic Review*, 1998, 39(4), pp. 943–48.
- Sims, Christopher A. and Zha, Tao.** "Error Bands for Impulse Responses." *Econometrica*, 1999, 67(5), pp. 1113–55.
- Stock, James H. and Watson, Mark W.** "A Comparison of Linear and Non-linear Univariate Models for Forecasting Macroeconomic Time Series," in Robert F. Engle and Halbert L. White, eds., *Cointegration, causality and Forecasting: A festschrift in honor of Clive W. J. Granger*. Oxford: Oxford University Press, 1999, pp. 1–44.
- Swanson, Norman R. and Granger, Clive W. J.** "Impulse Response Functions Based on a Causal Approach to Residual Orthogonalization in Vector Autoregressions." *Journal of the American Statistical Association*, 1997, 92(437), pp. 357–67.
- Taylor, John B.** "Discretion versus Policy Rules in Practice." *Carnegie-Rochester Conference Series on Public Policy*, 1993, 39(0), pp. 195–214.
- Taylor, John B., ed.** *Monetary policy rules*. NBER Research Studies in Business Cycles 1999. Chicago: University of Chicago Press, 1999.
- Thapar, Aditi.** "Using Private Forecasts to Estimate the Effects of Monetary Policy." Unpublished Paper, 2002.
- Tsay, Ruey S.** "Calculating Interval Forecasts: Comment: Adaptive Forecasting." *Journal of Business and Economic Statistics*, 1993, 11(2), pp. 140–42.
- Tsay, Ruey S.** "Testing and Modelling Multivariate Threshold Models." *Journal of the American Statistical Association*, 1998, 93(443), pp. 1188–202.
- Wallis, Kenneth F.** "Multiple Time Series and the Final Form of Econometric Models" *Econometrica*, 1977, 45(6), pp. 1481–97.
- Weiss, Andrew A.** "Multi-Step Estimation and Forecasting in Dynamic Models." *Journal of Econometrics*, 1991, 48(1–2), pp. 135–49.
- Zellner, Arnold and Palm, Franz.** "Time Series Analysis and Simultaneous Equation Econometric Models." *Journal of Econometrics*, 1974, 2(1), pp. 17–54.

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28. Joel Hasbrouck. 2019. Price Discovery in High Resolution*. *Journal of Financial Econometrics* **39**. . [[Crossref](#)]
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30. M. Billio, M. Donadelli, G. Livieri, A. Paradiso. 2019. On the role of domestic and international financial cyclical factors in driving economic growth. *Applied Economics* **67**, 1-26. [[Crossref](#)]
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45. Toyochiro Shirota. 2019. Shock matters for estimating monetary policy rules. *Economics Letters* **181**, 54-56. [[Crossref](#)]
46. Georgios Karras. 2019. Are “twin deficits” asymmetric? Evidence on government budget and current account balances, 1870–2013. *International Economics* **158**, 12-24. [[Crossref](#)]
47. E. Falck, M. Hoffmann, P. Hürtgen. 2019. Disagreement about inflation expectations and monetary policy transmission. *Journal of Monetary Economics* . [[Crossref](#)]
48. BRUNO ALBUQUERQUE. 2019. One Size Fits All? Monetary Policy and Asymmetric Household Debt Cycles in U.S. States. *Journal of Money, Credit and Banking* **51**:5, 1309-1353. [[Crossref](#)]
49. SAMI ALPANDA, SARAH ZUBAIRY. 2019. Household Debt Overhang and Transmission of Monetary Policy. *Journal of Money, Credit and Banking* **51**:5, 1265-1307. [[Crossref](#)]
50. MATHIAS KLEIN, LUDGER LINNEMANN. 2019. Macroeconomic Effects of Government Spending: The Great Recession was (Really) Different. *Journal of Money, Credit and Banking* **51**:5, 1237-1264. [[Crossref](#)]
51. Romain Duval, Davide Furceri, Joao Jalles. 2019. Job protection deregulation in good and bad times. *Oxford Economic Papers* **93**. . [[Crossref](#)]
52. Yuriy Gorodnichenko, Byoungchan Lee. 2019. Forecast Error Variance Decompositions with Local Projections. *Journal of Business & Economic Statistics* **79**, 1-24. [[Crossref](#)]
53. Masahiro Tanaka. 2019. Bayesian Inference of Local Projections with Roughness Penalty Priors. *Computational Economics* **99**. . [[Crossref](#)]
54. Soojin Jo, Rodrigo Sekkel. 2019. Macroeconomic Uncertainty Through the Lens of Professional Forecasters. *Journal of Business & Economic Statistics* **37**:3, 436-446. [[Crossref](#)]
55. Yaein Baek. 2019. Forecasting in long horizons using smoothed direct forecast. *Journal of Forecasting* **38**:4, 277-292. [[Crossref](#)]
56. Chi-Young Choi, Alexander Chudik. 2019. Estimating impulse response functions when the shock series is observed. *Economics Letters* **180**, 71-75. [[Crossref](#)]
57. Wen Zhang. 2019. Political incentives and local government spending multiplier: Evidence for Chinese provinces (1978–2016). *Economic Modelling* . [[Crossref](#)]
58. Yu-Fan Huang. 2019. Dynamic responses of real output to financial spreads. *International Review of Economics & Finance* **62**, 153-159. [[Crossref](#)]
59. Matteo Iacoviello, Gaston Navarro. 2019. Foreign effects of higher U.S. interest rates. *Journal of International Money and Finance* **95**, 232-250. [[Crossref](#)]
60. Lucas Husted, John Rogers, Bo Sun. 2019. Monetary policy uncertainty. *Journal of Monetary Economics* . [[Crossref](#)]

61. Regis Barnichon, Christian Brownlees. 2019. Impulse Response Estimation by Smooth Local Projections. *The Review of Economics and Statistics* **101**:3, 522-530. [[Crossref](#)]
62. Juan Equiza-Goñi, Fernando Perez de Gracia. 2019. Impact of state-dependent oil price on US stock returns using local projections. *Applied Economics Letters* **26**:11, 919-926. [[Crossref](#)]
63. Makram El-Shagi. 2019. A simple estimator for smooth local projections. *Applied Economics Letters* **26**:10, 830-834. [[Crossref](#)]
64. Jamus Jerome Lim. 2019. Growth in the shadow of debt. *Journal of Banking & Finance* **103**, 98-112. [[Crossref](#)]
65. Beatrice Scheubel, Livio Stracca, Cédric Tille. 2019. Taming the global financial cycle: What role for the global financial safety net?. *Journal of International Money and Finance* **94**, 160-182. [[Crossref](#)]
66. Gabriel Di Bella, Francesco Grigoli. 2019. Optimism, pessimism, and short-term fluctuations. *Journal of Macroeconomics* **60**, 79-96. [[Crossref](#)]
67. Christian Glocker, Giulia Sestieri, Pascal Towbin. 2019. Time-varying government spending multipliers in the UK. *Journal of Macroeconomics* **60**, 180-197. [[Crossref](#)]
68. Tim Oliver Berg. 2019. BUSINESS UNCERTAINTY AND THE EFFECTIVENESS OF FISCAL POLICY IN GERMANY. *Macroeconomic Dynamics* **23**:4, 1442-1470. [[Crossref](#)]
69. Bart Hobijn, Fernanda Nechio. 2019. Sticker Shocks: Using VAT Changes to Estimate Upper-Level Elasticities of Substitution. *Journal of the European Economic Association* **17**:3, 799-833. [[Crossref](#)]
70. Joao Tovar Jalles. 2019. Crises and emissions: New empirical evidence from a large sample. *Energy Policy* **129**, 880-895. [[Crossref](#)]
71. Mónica Correa-López, Rafael Doménech. 2019. Service Regulations, Input Prices and Export Volumes: Evidence from a Panel of Manufacturing Firms. *The Journal of Industrial Economics* **67**:2, 328-371. [[Crossref](#)]
72. Tigran Poghosyan. 2019. Cross-country spillovers of fiscal consolidations in the euro area. *International Finance* **103**. [[Crossref](#)]
73. Wang Chen, Shigeyuki Hamori, Takuji Kinkyo. 2019. Dynamic effects of financial spillovers on bank lending: evidence from local projection-based impulse response analysis. *Applied Economics Letters* 1-6. [[Crossref](#)]
74. Alberto Alesina, Carlo Favero, Francesco Giavazzi. 2019. Effects of Austerity: Expenditure- and Tax-based Approaches. *Journal of Economic Perspectives* **33**:2, 141-162. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
75. Theodore Panagiotidis, Thanasis Stengos, Orestis Vravosinos. 2019. The effects of markets, uncertainty and search intensity on bitcoin returns. *International Review of Financial Analysis* **63**, 220-242. [[Crossref](#)]
76. Jan Klingelhöfer, Rongrong Sun. 2019. Macroprudential policy, central banks and financial stability: Evidence from China. *Journal of International Money and Finance* **93**, 19-41. [[Crossref](#)]
77. Anamaria Illes, Marco J. Lombardi, Paul Mizen. 2019. The divergence of bank lending rates from policy rates after the financial crisis: The role of bank funding costs. *Journal of International Money and Finance* **93**, 117-141. [[Crossref](#)]
78. Björn Richter, Moritz Schularick, Ilhyock Shim. 2019. The costs of macroprudential policy. *Journal of International Economics* **118**, 263-282. [[Crossref](#)]
79. Christoph E. Boehm. 2019. Government consumption and investment: Does the composition of purchases affect the multiplier?. *Journal of Monetary Economics*. [[Crossref](#)]
80. Concha Betrán, Maria A Pons. 2019. Understanding Spanish financial crises severity, 1850–2015. *European Review of Economic History* **23**:2, 175-192. [[Crossref](#)]

81. Wei-Fong Pan. 2019. Does Investor Sentiment Drive Stock Market Bubbles? Beware of Excessive Optimism!. *Journal of Behavioral Finance* **25**, 1-15. [[Crossref](#)]
82. Pratiti Chatterjee. 2019. Asymmetric impact of uncertainty in recessions: are emerging countries more vulnerable?. *Studies in Nonlinear Dynamics & Econometrics* **23**:2. . [[Crossref](#)]
83. Cem Çebi, K.Azim Özdemir. 2019. Cyclical variation of the fiscal multiplier in Turkey. *Emerging Markets Finance and Trade* **25**, 1-15. [[Crossref](#)]
84. Maria Björklund, Mikael Carlsson, Oskar Nordström Skans. 2019. Fixed-Wage Contracts and Monetary Non-neutrality. *American Economic Journal: Macroeconomics* **11**:2, 171-192. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
85. Sangyup Choi, Myungkyu Shim. 2019. Financial vs. Policy Uncertainty in Emerging Market Economies. *Open Economies Review* **30**:2, 297-318. [[Crossref](#)]
86. Rüdiger Bachmann. 2019. Erfolge und Probleme der modernen (Mainstream-)Makroökonomik. *List Forum für Wirtschafts- und Finanzpolitik* **44**:4, 451-493. [[Crossref](#)]
87. Hongyi Chen, Ran Li, Peter Tillmann. 2019. Pushing on a string: State-owned enterprises and monetary policy transmission in China. *China Economic Review* **54**, 26-40. [[Crossref](#)]
88. Aurélien Leroy, Adrian Pop. 2019. Macro-financial linkages: The role of the institutional framework. *Journal of International Money and Finance* **92**, 75-97. [[Crossref](#)]
89. David Rezza Baqaee. 2019. Asymmetric inflation expectations, downward rigidity of wages, and asymmetric business cycles. *Journal of Monetary Economics* . [[Crossref](#)]
90. Chiara Guerello, Pina Murè, Natasha RoVo, Marco Spallone. 2019. On the informative content of sanctions. *The North American Journal of Economics and Finance* **48**, 591-612. [[Crossref](#)]
91. Gong Cheng, Javier Diaz-Cassou, Aitor Erce. 2019. The macroeconomic effects of official debt restructuring: evidence from the Paris Club. *Oxford Economic Papers* **71**:2, 344-363. [[Crossref](#)]
92. Eric Ghysels. 2019. Comment on: Price Discovery in High Resolution. *Journal of Financial Econometrics* **89**. . [[Crossref](#)]
93. Farhad Taghizadeh-Hesary, Naoyuki Yoshino, Sayoko Shimizu. 2019. The impact of monetary and tax policy on income inequality in Japan. *The World Economy* **70**. . [[Crossref](#)]
94. Michael W. McCracken, Joseph T. McGillicuddy. 2019. An empirical investigation of direct and iterated multistep conditional forecasts. *Journal of Applied Econometrics* **34**:2, 181-204. [[Crossref](#)]
95. Mathias Klein, Roland Winkler. 2019. Austerity, inequality, and private debt overhang. *European Journal of Political Economy* **57**, 89-106. [[Crossref](#)]
96. Raju Huidrom, M. Ayhan Kose, Jamus J. Lim, Franziska L. Ohnsorge. 2019. Why do fiscal multipliers depend on fiscal Positions?. *Journal of Monetary Economics* . [[Crossref](#)]
97. Marcio Holland, Emerson Marçal, Diogo de Prince. 2019. Is fiscal policy effective in Brazil? An empirical analysis. *The Quarterly Review of Economics and Finance* . [[Crossref](#)]
98. Òscar Jordà, Moritz Schularick, Alan M. Taylor, Felix Ward. 2019. Global Financial Cycles and Risk Premiums. *IMF Economic Review* **67**:1, 109-150. [[Crossref](#)]
99. Efrem Castelnuovo, Guay Lim. 2019. What Do We Know About the Macroeconomic Effects of Fiscal Policy? A Brief Survey of the Literature on Fiscal Multipliers. *Australian Economic Review* **52**:1, 78-93. [[Crossref](#)]
100. Wen Zhang, Yangyang Zhang, Xinye Zheng, Li Zhang. 2019. China's Fiscal Multiplier and Its State Dependence. *The Manchester School* **87**:2, 205-227. [[Crossref](#)]
101. Julio Garín, Robert Lester, Eric Sims. 2019. Are Supply Shocks Contractionary at the ZLB? Evidence from Utilization-Adjusted TFP Data. *The Review of Economics and Statistics* **101**:1, 160-175. [[Crossref](#)]

102. António Afonso, João Tovar Jalles. 2019. Fiscal Rules and Government Financing Costs. *Fiscal Studies* **19**. . [\[Crossref\]](#)
103. Òscar Jordà, Moritz Schularick, Alan M. Taylor. 2019. The effects of quasi-random monetary experiments. *Journal of Monetary Economics* . [\[Crossref\]](#)
104. Sotiris K. Papaioannou. 2019. The effects of fiscal policy on output: Does the business cycle matter?. *The Quarterly Review of Economics and Finance* **71**, 27-36. [\[Crossref\]](#)
105. Gordon C. R. Kemp, Paulo M. D. C. Parente, J. M. C. Santos Silva. 2019. Dynamic Vector Mode Regression. *Journal of Business & Economic Statistics* **79**, 1-32. [\[Crossref\]](#)
106. Gabriel Chodorow-Reich, John Coglianesi, Loukas Karabarbounis. 2019. The Macro Effects of Unemployment Benefit Extensions: a Measurement Error Approach*. *The Quarterly Journal of Economics* **134**:1, 227-279. [\[Crossref\]](#)
107. Dario Caldara, Edward Herbst. 2019. Monetary Policy, Real Activity, and Credit Spreads: Evidence from Bayesian Proxy SVARs. *American Economic Journal: Macroeconomics* **11**:1, 157-192. [\[Abstract\]](#) [\[View PDF article\]](#) [\[PDF with links\]](#)
108. Nicolas Doremus, Alessio Moneta, Sebastiano Cattaruzzo. Cause-Effect Pairs in Time Series with a Focus on Econometrics 191-214. [\[Crossref\]](#)
109. Goodness C. Aye, Matthew W. Clance, Rangan Gupta. 2019. The effectiveness of monetary and fiscal policy shocks on U.S. inequality: the role of uncertainty. *Quality & Quantity* **53**:1, 283-295. [\[Crossref\]](#)
110. Majid M. Al-Sadoon. 2019. Testing subspace Granger causality. *Econometrics and Statistics* **9**, 42-61. [\[Crossref\]](#)
111. Nadav Ben Zeev. 2019. Global credit supply shocks and exchange rate regimes. *Journal of International Economics* **116**, 1-32. [\[Crossref\]](#)
112. Yao Chen, Felix Ward. 2019. When do fixed exchange rates work? Evidence from the Gold Standard. *Journal of International Economics* **116**, 158-172. [\[Crossref\]](#)
113. Wataru Miyamoto, Thuy Lan Nguyen, Viacheslav Sheremirov. 2019. The effects of government spending on real exchange rates: Evidence from military spending panel data. *Journal of International Economics* **116**, 144-157. [\[Crossref\]](#)
114. Máximo Camacho, Gonzalo Palmieri. 2019. Do economic recessions cause inequality to rise?. *Journal of Applied Economics* **22**:1, 304-320. [\[Crossref\]](#)
115. Andrea Bassanini, Federico Cingano. 2019. Before It Gets Better: The Short-Term Employment Costs of Regulatory Reforms. *ILR Review* **72**:1, 127-157. [\[Crossref\]](#)
116. Stijn Ferrari, Pablo Rovira Kaltwasser. 2019. Sectoral Credit Cycles and Systemic Risk in the United States. *SSRN Electronic Journal* . [\[Crossref\]](#)
117. Michael Donadelli, Marcus Jüppner, Antonio Paradiso, Christian Schlag. 2019. Temperature Volatility Risk. *SSRN Electronic Journal* . [\[Crossref\]](#)
118. Joseph Kopecky. 2019. Less Perfect Unions: Average Treatment Effects of Currency Unions and the EMU on Trade Over Time. *SSRN Electronic Journal* . [\[Crossref\]](#)
119. Seohyun Lee, Rickard Nyman. 2019. Tracking Uncertainty Through the Relative Sentiment Shift Series. *SSRN Electronic Journal* . [\[Crossref\]](#)
120. Anna SamarIna, Anh D. M. Nguyen. 2019. Does Monetary Policy Affect Income Inequality in the Euro Area?. *SSRN Electronic Journal* . [\[Crossref\]](#)
121. Stephanie Titzck, Jan Willem van den End. 2019. The Impact of Size, Composition and Duration of the Central Bank Balance Sheet on Inflation Expectations and Market Prices. *SSRN Electronic Journal* . [\[Crossref\]](#)

122. Subhendu Bhowal. 2019. Heterogenous Banks and Macroprudential Regulations. *SSRN Electronic Journal* . [\[Crossref\]](#)
123. Raju Huidrom, M. Ayhan Kose, Jamus J. Lim, Franziska Ohnsorge. 2019. Why Do Fiscal Multipliers Depend on Fiscal Positions?. *SSRN Electronic Journal* . [\[Crossref\]](#)
124. James Cloyne, Clodomiro Ferreira, Maren Froemel, Paolo Surico. 2019. Monetary Policy, Corporate Finance and Investment. *SSRN Electronic Journal* . [\[Crossref\]](#)
125. Ruhollah Eskandari. 2019. State-Dependent Macroeconomic Effects of Tax Changes. *SSRN Electronic Journal* . [\[Crossref\]](#)
126. Mehdi El Herradi, Aurélien Leroy. 2019. Monetary Policy and the Top One Percent: Evidence from a Century of Modern Economic History. *SSRN Electronic Journal* . [\[Crossref\]](#)
127. Katya Kartashova, Xiaoqing Zhou. 2019. Mortgage Rate Refinancing and Household Balance Sheets: Evidence from Expansionary and Contractionary Monetary Policy Episodes. *SSRN Electronic Journal* . [\[Crossref\]](#)
128. Sangyup Choi, Chansik Yoon. 2019. Uncertainty, Financial Markets, and Monetary Policy over the Last Century. *SSRN Electronic Journal* . [\[Crossref\]](#)
129. Niels D. Gilbert. 2019. Euro Area Sovereign Risk Spillovers Before and after the Ecb's OMT Announcement. *SSRN Electronic Journal* . [\[Crossref\]](#)
130. Ruhollah Eskandari, Morteza Zamanian. 2019. Marginal Tax Rates and Corporate Investment. *SSRN Electronic Journal* . [\[Crossref\]](#)
131. Matthew Baron. 2019. Banking Crises under a Microscope. *SSRN Electronic Journal* . [\[Crossref\]](#)
132. Olivier Darmouni, Oliver Giesecke, Alexander Rodnyansky. 2019. The Bond Lending Channel of Monetary Policy. *SSRN Electronic Journal* . [\[Crossref\]](#)
133. Andrei Gonçalves. 2019. What Moves Equity Markets? A Term Structure Decomposition for Stock Returns. *SSRN Electronic Journal* . [\[Crossref\]](#)
134. Mikkel Plagborg-Møller. 2019. Bayesian inference on structural impulse response functions. *Quantitative Economics* **10**:1, 145-184. [\[Crossref\]](#)
135. Sung Je Byun, Lawrence Schmidt. 2019. Real Risk or Paper Risk? Mis-Measured Factors, Granular Measurement Errors, and Empirical Asset Pricing Tests. *SSRN Electronic Journal* . [\[Crossref\]](#)
136. Shingo Watanabe. 2018. WHAT DO BRITISH HISTORICAL DATA TELL US ABOUT GOVERNMENT SPENDING MULTIPLIERS?. *Economic Inquiry* **4** . [\[Crossref\]](#)
137. Vivian Hwa, Pavel Kapinos, Carlos D. Ramirez. 2018. Does regulatory bank oversight impact economic activity? A local projections approach. *Journal of Financial Stability* **39**, 167-174. [\[Crossref\]](#)
138. Johannes Bubeck, Maurizio Michael Habib, Simone Manganelli. 2018. The portfolio of euro area fund investors and ECB monetary policy announcements. *Journal of International Money and Finance* **89**, 103-126. [\[Crossref\]](#)
139. Chak Hung Jack Cheng, Ching-Wai (Jeremy) Chiu, William B. Hankins, Anna-Leigh Stone. 2018. Partisan conflict, policy uncertainty and aggregate corporate cash holdings. *Journal of Macroeconomics* **58**, 78-90. [\[Crossref\]](#)
140. Javier Cravino, Ting Lan, Andrei A. Levchenko. 2018. Price stickiness along the income distribution and the effects of monetary policy. *Journal of Monetary Economics* . [\[Crossref\]](#)
141. André Diniz. 2018. Effects of Fiscal Consolidations in Latin America. *IMF Economic Review* **66**:4, 694-731. [\[Crossref\]](#)
142. Makram El-Shagi. 2018. WHEN DOES MONETARY MEASUREMENT MATTER (MOST)?. *Macroeconomic Dynamics* **34**, 1-17. [\[Crossref\]](#)

143. Andrei A Levchenko, Nitya Pandalai-Nayar. 2018. Tfp, News, and “Sentiments”: the International Transmission of Business Cycles. *Journal of the European Economic Association* **81**. . [[Crossref](#)]
144. Mihály Tamás Borsi. 2018. Credit contractions and unemployment. *International Review of Economics & Finance* **58**, 573-593. [[Crossref](#)]
145. François-Éric Racicot, Raymond Théoret. 2018. Multi-moment risk, hedging strategies, & the business cycle. *International Review of Economics & Finance* **58**, 637-675. [[Crossref](#)]
146. Sheida Teimouri, Joachim Zietz. 2018. The impact of surges in net private capital inflows on manufacturing, investment, and unemployment. *Journal of International Money and Finance* **88**, 158-170. [[Crossref](#)]
147. Regis Barnichon, Christian Matthes. 2018. Functional Approximation of Impulse Responses. *Journal of Monetary Economics* **99**, 41-55. [[Crossref](#)]
148. Julien Champagne, Rodrigo Sekkel. 2018. Changes in monetary regimes and the identification of monetary policy shocks: Narrative evidence from Canada. *Journal of Monetary Economics* **99**, 72-87. [[Crossref](#)]
149. Gong Cheng, Javier Díaz-Cassou, Aitor Erce. 2018. Official debt restructurings and development. *World Development* **111**, 181-195. [[Crossref](#)]
150. Karel Mertens, José Luis Montiel Olea. 2018. Marginal Tax Rates and Income: New Time Series Evidence*. *The Quarterly Journal of Economics* **133**:4, 1803-1884. [[Crossref](#)]
151. Rafael Dix-Carneiro, Rodrigo R. Soares, Gabriel Ulyssea. 2018. Economic Shocks and Crime: Evidence from the Brazilian Trade Liberalization. *American Economic Journal: Applied Economics* **10**:4, 158-195. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
152. Carola Frydman, Dimitris Papanikolaou. 2018. In search of ideas: Technological innovation and executive pay inequality. *Journal of Financial Economics* **130**:1, 1-24. [[Crossref](#)]
153. William B. English, Skander J. Van den Heuvel, Egon Zakrajšek. 2018. Interest rate risk and bank equity valuations. *Journal of Monetary Economics* **98**, 80-97. [[Crossref](#)]
154. Christian Calmès, Raymond Théoret. 2018. Bank fee-based shocks and the U.S. business cycle. *The North American Journal of Economics and Finance* . [[Crossref](#)]
155. Atsushi Sekine, Takayuki Tsuruga. 2018. Effects of commodity price shocks on inflation: a cross-country analysis. *Oxford Economic Papers* **70**:4, 1108-1135. [[Crossref](#)]
156. Arno Hantzsche, Simon Savsek, Sebastian Weber. 2018. Labour Market Adjustments to Financing Conditions under Sectoral Rigidities in the Euro Area. *Open Economies Review* **29**:4, 769-794. [[Crossref](#)]
157. Victor Pontines. 2018. Self-selection and treatment effects: Revisiting the effectiveness of foreign exchange intervention. *Journal of Macroeconomics* **57**, 299-316. [[Crossref](#)]
158. Lucas Hafemann, Paul Rudel, Jörg Schmidt. 2018. Moving Closer or Drifting Apart: Distributional Effects of Monetary Policy. *The Manchester School* **86**:S1, 110-136. [[Crossref](#)]
159. Sanjeev Gupta, João T Jalles, Carlos Mulas-Granados, Michela Schena. 2018. Planned fiscal adjustments: Do governments fulfil their commitments?. *European Union Politics* **19**:3, 383-407. [[Crossref](#)]
160. Mark Gertler, Simon Gilchrist. 2018. What Happened: Financial Factors in the Great Recession. *Journal of Economic Perspectives* **32**:3, 3-30. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
161. Emi Nakamura, Jón Steinsson. 2018. Identification in Macroeconomics. *Journal of Economic Perspectives* **32**:3, 59-86. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
162. Laurent Ferrara, Pierre Guérin. 2018. What are the macroeconomic effects of high-frequency uncertainty shocks?. *Journal of Applied Econometrics* **33**:5, 662-679. [[Crossref](#)]

163. Clément Malgouyres, Thierry Mayer. 2018. Exports and labor costs: evidence from a French policy. *Review of World Economics* **154**:3, 429-454. [[Crossref](#)]
164. Andrew J Fieldhouse, Karel Mertens, Morten O Ravn. 2018. The Macroeconomic Effects of Government Asset Purchases: Evidence from Postwar U.S. Housing Credit Policy*. *The Quarterly Journal of Economics* **133**:3, 1503-1560. [[Crossref](#)]
165. Eric Sims, Jonathan Wolff. 2018. THE OUTPUT AND WELFARE EFFECTS OF GOVERNMENT SPENDING SHOCKS OVER THE BUSINESS CYCLE. *International Economic Review* **59**:3, 1403-1435. [[Crossref](#)]
166. Hector Carcel, Luis A. Gil-Alana, Peter Wanke. 2018. Application of local projections in the monetary policy in Brazil. *Applied Economics Letters* **25**:13, 941-944. [[Crossref](#)]
167. Martin Ademmer, Nils Jannsen. 2018. Post-crisis business investment in the euro area and the role of monetary policy. *Applied Economics* **50**:34-35, 3787-3797. [[Crossref](#)]
168. Joshua D. Angrist, Òscar Jordà, Guido M. Kuersteiner. 2018. Semiparametric Estimates of Monetary Policy Effects: String Theory Revisited. *Journal of Business & Economic Statistics* **36**:3, 371-387. [[Crossref](#)]
169. Michael Amior, Alan Manning. 2018. The Persistence of Local Joblessness. *American Economic Review* **108**:7, 1942-1970. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
170. Wataru Miyamoto, Thuy Lan Nguyen, Dmitriy Sergeyev. 2018. Government Spending Multipliers under the Zero Lower Bound: Evidence from Japan. *American Economic Journal: Macroeconomics* **10**:3, 247-277. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
171. Ryan N. Banerjee, Hitoshi Mio. 2018. The impact of liquidity regulation on banks. *Journal of Financial Intermediation* **35**, 30-44. [[Crossref](#)]
172. Davide Furceri, Prakash Loungani, Aleksandra Zdzienicka. 2018. The effects of monetary policy shocks on inequality. *Journal of International Money and Finance* **85**, 168-186. [[Crossref](#)]
173. Jon Frost, René van Stralen. 2018. Macropprudential policy and income inequality. *Journal of International Money and Finance* **85**, 278-290. [[Crossref](#)]
174. Ida Hjortsoe, Martin Weale, Tomasz Wieladek. 2018. How does financial liberalisation affect the influence of monetary policy on the current account?. *Journal of International Money and Finance* **85**, 93-123. [[Crossref](#)]
175. Wei-Fong Pan. 2018. HOW DOES THE MACROECONOMY RESPOND TO STOCK MARKET FLUCTUATIONS? THE ROLE OF SENTIMENT. *Macroeconomic Dynamics* **79**, 1-26. [[Crossref](#)]
176. Marco Bernardini, Gert Peersman. 2018. Private debt overhang and the government spending multiplier: Evidence for the United States. *Journal of Applied Econometrics* **33**:4, 485-508. [[Crossref](#)]
177. Yoon-Jin Lee, Ryo Okui, Mototsugu Shintani. 2018. Asymptotic inference for dynamic panel estimators of infinite order autoregressive processes. *Journal of Econometrics* **204**:2, 147-158. [[Crossref](#)]
178. Salvatore Dell'Erba, Ksenia Koloskova, Marcos Poplawski-Ribeiro. 2018. Medium-term fiscal multipliers during protracted economic contractions. *Journal of Macroeconomics* **56**, 35-52. [[Crossref](#)]
179. Mihály Tamás Borsi. 2018. Fiscal multipliers across the credit cycle. *Journal of Macroeconomics* **56**, 135-151. [[Crossref](#)]
180. Pierre L. Siklos. 2018. Boom-and-bust cycles in emerging markets: How important is the exchange rate?. *Journal of Macroeconomics* **56**, 172-187. [[Crossref](#)]
181. Elva BOVA, João TOVAR JALLES, Christina KOLERUS. 2018. Shifting the Beveridge curve: What affects labour market matching?. *International Labour Review* **157**:2, 267-306. [[Crossref](#)]

182. Elva BOVA, João TOVAR JALLES, Christina KOLERUS. 2018. Les déterminants des déplacements de la courbe de Beveridge (et de l'appariement sur le marché du travail). *Revue internationale du Travail* 157:2, 301-345. [[Crossref](#)]
183. Elva BOVA, João TOVAR JALLES, Christina KOLERUS. 2018. La curva de Beveridge y los determinantes del emparejamiento en el mercado de trabajo. *Revista Internacional del Trabajo* 137:2, 291-335. [[Crossref](#)]
184. Paweł Gajewski, Ali M Kutan. 2018. Determinants and Economic Effects of New Firm Creation: Evidence from Polish Regions. *Eastern European Economics* 56:3, 201-222. [[Crossref](#)]
185. Elena Deryugina, Alexey Ponomarenko, Andrey Sinyakov, Constantine Sorokin. 2018. Evaluating underlying inflation measures for Russia. *Macroeconomics and Finance in Emerging Market Economies* 11:2, 124-145. [[Crossref](#)]
186. Abdul Abiad, Margarita Debuque-Gonzales, Andrea Loren Sy. 2018. The Evolution and Impact of Infrastructure in Middle-Income Countries: Anything Special?. *Emerging Markets Finance and Trade* 54:6, 1239-1263. [[Crossref](#)]
187. Akihisa Kato, Wataru Miyamoto, Thuy Lan Nguyen, Dmitriy Sergeyev. 2018. The Effects of Tax Changes at the Zero Lower Bound: Evidence from Japan. *AEA Papers and Proceedings* 108, 513-518. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
188. Eduardo Cavallo, Barry Eichengreen, Ugo Panizza. 2018. Can countries rely on foreign saving for investment and economic development?. *Review of World Economics* 154:2, 277-306. [[Crossref](#)]
189. Ambrogio Cesa-Bianchi, Andrea Ferrero, Alessandro Rebucci. 2018. International credit supply shocks. *Journal of International Economics* 112, 219-237. [[Crossref](#)]
190. James H. Stock, Mark W. Watson. 2018. Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments. *The Economic Journal* 128:610, 917-948. [[Crossref](#)]
191. Philipp Heimberger. 2018. The dynamic effects of fiscal consolidation episodes on income inequality: evidence for 17 OECD countries over 1978–2013. *Empirica* 113. . [[Crossref](#)]
192. Shulin Shen, Jindong Pang. 2018. Measuring the diffusion of housing prices across space and over time: Replication and further evidence. *Journal of Applied Econometrics* 33:3, 479-484. [[Crossref](#)]
193. Dario Bonciani, Andrea Tafuro. 2018. The Effects of Uncertainty Shocks on Daily Prices. *Journal of Business Cycle Research* 14:1, 89-104. [[Crossref](#)]
194. Sangyup Choi, Davide Furceri, Prakash Loungani, Saurabh Mishra, Marcos Poplawski-Ribeiro. 2018. Oil prices and inflation dynamics: Evidence from advanced and developing economies. *Journal of International Money and Finance* 82, 71-96. [[Crossref](#)]
195. Philip R Lane, Livio Stracca. 2018. Can appreciation be expansionary? Evidence from the euro area. *Economic Policy* 33:94, 225-264. [[Crossref](#)]
196. Albi Tola, Sébastien Waelti. 2018. FINANCIAL CRISES, OUTPUT LOSSES, AND THE ROLE OF STRUCTURAL REFORMS. *Economic Inquiry* 56:2, 761-798. [[Crossref](#)]
197. Shafik Hebous, Tom Zimmermann. 2018. Revisiting the Narrative Approach of Estimating Tax Multipliers. *The Scandinavian Journal of Economics* 120:2, 428-439. [[Crossref](#)]
198. Jason Lennard. 2018. Did monetary policy matter? Narrative evidence from the classical gold standard. *Explorations in Economic History* 68, 16-36. [[Crossref](#)]
199. Yuliya Lovcha, Alejandro Perez-Laborda. 2018. Monetary policy shocks, inflation persistence, and long memory. *Journal of Macroeconomics* 55, 117-127. [[Crossref](#)]
200. Romain Duval, Davide Furceri. 2018. The Effects of Labor and Product Market Reforms: The Role of Macroeconomic Conditions and Policies. *IMF Economic Review* 66:1, 31-69. [[Crossref](#)]

201. Alberto Alesina, Gualtiero Azzalini, Carlo Favero, Francesco Giavazzi, Armando Miano. 2018. Is it the “How” or the “When” that Matters in Fiscal Adjustments?. *IMF Economic Review* **66**:1, 144-188. [[Crossref](#)]
202. Hiroyuki Kawakatsu. 2018. Direct multiperiod forecasting for algorithmic trading. *Journal of Forecasting* **37**:1, 83-101. [[Crossref](#)]
203. Anna Rose Bordon, Christian Ebeke, Kazuko Shirono. When Do Structural Reforms Work? On the Role of the Business Cycle and Macroeconomic Policies 147-171. [[Crossref](#)]
204. Alexander Hijzen, Andreas Kappeler, Mathilde Pak, Cyrille Schwellnus. Labour Market Resilience: The Role of Structural and Macroeconomic Policies 173-198. [[Crossref](#)]
205. I.C. Pragidis, P. Tsintzos, B. Plakandaras. 2018. Asymmetric effects of government spending shocks during the financial cycle. *Economic Modelling* **68**, 372-387. [[Crossref](#)]
206. Davide Furceri, Prakash Loungani. 2018. The distributional effects of capital account liberalization. *Journal of Development Economics* **130**, 127-144. [[Crossref](#)]
207. Christina D. Romer, David H. Romer. 2018. Phillips Lecture - Why Some Times Are Different: Macroeconomic Policy and the Aftermath of Financial Crises. *Economica* **85**:337, 1-40. [[Crossref](#)]
208. Felipe Bastos G. Silva. 2018. The Effect of Fiscal Policy on Banks' Financial Reporting. *SSRN Electronic Journal* . [[Crossref](#)]
209. Priit Jeenas. 2018. Monetary Policy Shocks, Financial Structure, and Firm Activity: A Panel Approach. *SSRN Electronic Journal* . [[Crossref](#)]
210. Gino Cenedese, Ilaf Elard. 2018. Unconventional Monetary Policy and the Portfolio Choice of International Mutual Funds. *SSRN Electronic Journal* . [[Crossref](#)]
211. Pierre L. Siklos. 2018. Boom and Bust Cycles in Emerging Markets: How Important is the Exchange Rate?. *SSRN Electronic Journal* . [[Crossref](#)]
212. Daniele Girardi, Walter Meloni, Antonella Stirati. 2018. Persistent Effects of Autonomous Demand Expansions. *SSRN Electronic Journal* . [[Crossref](#)]
213. Hilde C. Bijnland, Leif Anders Thorsrud, Ragnar Torvik. 2018. Dutch Disease Dynamics Reconsidered. *SSRN Electronic Journal* . [[Crossref](#)]
214. Allan Kayongo. 2018. Micro and Macro Effects of Product Market Reforms: Evidence from Most Recent Research. *SSRN Electronic Journal* . [[Crossref](#)]
215. Aurlien Leroy, Adrian Pop. 2018. Macro-Financial Linkages: The Role of the Institutional Framework. *SSRN Electronic Journal* . [[Crossref](#)]
216. Joshua R. Hendrickson. 2018. The Riksbank, Emergency Finance, Policy Experimentation, and Sweden's Reversal of Fortune. *SSRN Electronic Journal* . [[Crossref](#)]
217. Siming Liu. 2018. Government Spending During Sudden Stop Crises. *SSRN Electronic Journal* . [[Crossref](#)]
218. Victor Pontines. 2018. Self-Selection and Treatment Effects in Macroeconomics: Revisiting the Effectiveness of Foreign Exchange Intervention. *SSRN Electronic Journal* . [[Crossref](#)]
219. Chak Hung Jack Cheng, Ching-Wai (Jeremy) Chiu, William Hankins, Anna-Leigh Stone. 2018. Partisan Conflict, Policy Uncertainty and Aggregate Corporate Cash Holdings. *SSRN Electronic Journal* . [[Crossref](#)]
220. Fernando Broner, Daragh Clancy, Alberto Martin, Aitor Erce. 2018. Fiscal Multipliers and Foreign Holdings of Public Debt. *SSRN Electronic Journal* . [[Crossref](#)]
221. Tim Alexander Kroencke. 2018. Recessions and the Stock Market. *SSRN Electronic Journal* . [[Crossref](#)]

222. Atanas Pekanov. 2018. The New View on Fiscal Policy and Its Implications for the European Monetary Union. *SSRN Electronic Journal* . [[Crossref](#)]
223. Martina Cecioni. 2018. ECB Monetary Policy and the Euro Exchange Rate. *SSRN Electronic Journal* . [[Crossref](#)]
224. Andrea Colciago, Anna Samarina, Jakob de Haan. 2018. Central Bank Policies and Income and Wealth Inequality: A Survey. *SSRN Electronic Journal* . [[Crossref](#)]
225. Simas Kucinskas, Florian S. Peters. 2018. Measuring Biases in Expectation Formation. *SSRN Electronic Journal* . [[Crossref](#)]
226. Jon Frost, Rene van Stralen. 2018. Macroprudential Policy and Income Inequality. *SSRN Electronic Journal* . [[Crossref](#)]
227. Mario Alloza, Pablo Burriel, Javier J. Perez. 2018. Fiscal Policies in the Euro Area: Revisiting the Size of Spillovers. *SSRN Electronic Journal* . [[Crossref](#)]
228. Björn Richter, Moritz Schularick, Ilhyock Shim. 2018. The Macroeconomic Effects of Macroprudential Policy. *SSRN Electronic Journal* . [[Crossref](#)]
229. Mathias Klein, Ludger Linnemann. 2018. Macroeconomic Effects of Government Spending: The Great Recession Was (Really) Different. *SSRN Electronic Journal* . [[Crossref](#)]
230. Carola Binder. 2018. Political Pressure on Central Banks. *SSRN Electronic Journal* . [[Crossref](#)]
231. Knut Aastveit, Andre Kallak Anundsen. 2018. Asymmetric Effects of Monetary Policy in Regional Housing Markets. *SSRN Electronic Journal* . [[Crossref](#)]
232. Sandra Eickmeier, Benedikt Kolb, Esteban Prieto. 2018. Effects of Bank Capital Requirement Tightenings on Inequality. *SSRN Electronic Journal* . [[Crossref](#)]
233. Maria Sandström. 2018. The Impact of Monetary Policy on Household Borrowing - a High-Frequency IV Identification. *SSRN Electronic Journal* . [[Crossref](#)]
234. Carlos Carvalho, Fernanda Nechio, Tiago Tristão. 2018. Taylor Rule Estimation by OLS. *SSRN Electronic Journal* . [[Crossref](#)]
235. David Beckworth. 2018. Better Risk Sharing Through Monetary Policy?: The Financial Stability Case for a Nominal GDP Target. *SSRN Electronic Journal* . [[Crossref](#)]
236. Konstantinos Chisridis, Theodore Panagiotidis. 2018. The Relationship Between Greek Exports and Foreign Income. *Applied Economics Quarterly* **64**:1, 99-114. [[Crossref](#)]
237. Gabriel Di Bella, Francesco Grigoli. 2018. Optimism, Pessimism, and Short-Term Fluctuations. *IMF Working Papers* **18**:1, 1. [[Crossref](#)]
238. International Monetary Fund.. 2018. Republic of Croatia: Selected Issues. *IMF Staff Country Reports* **18**:6, 1. [[Crossref](#)]
239. Divya Kirti. 2018. Lending Standards and Output Growth. *IMF Working Papers* **18**:23, 1. [[Crossref](#)]
240. Davide Furceri, Jun Ge, Prakash Loungani, Giovanni Melina. 2018. The Distributional Effects of Government Spending Shocks in Developing Economies. *IMF Working Papers* **18**:57, 1. [[Crossref](#)]
241. Gabriele Ciminelli, Romain Duval, Davide Furceri. 2018. Employment Protection Deregulation and Labor Shares in Advanced Economies. *IMF Working Papers* **18**:186, 1. [[Crossref](#)]
242. Tobias Adrian, Federico Grinberg, Nellie Liang, Sheheryar Malik. 2018. The Term Structure of Growth-at-Risk. *IMF Working Papers* **18**:180, 1. [[Crossref](#)]
243. 2018. Cameroon: Selected Issues. *IMF Staff Country Reports* **18**:256, 1. [[Crossref](#)]
244. Ethan Min Fang. 2018. Monetary Policy Transmission Through Financial Heterogeneity: Firm-Level Evidence. *SSRN Electronic Journal* . [[Crossref](#)]

245. Joshua R. Hendrickson. 2017. Interest on reserves, settlement, and the effectiveness of monetary policy. *Journal of Macroeconomics* **54**, 208-216. [[Crossref](#)]
246. LUTZ KILIAN, ROBERT J. VIGFUSSON. 2017. The Role of Oil Price Shocks in Causing U.S. Recessions. *Journal of Money, Credit and Banking* **49**:8, 1747-1776. [[Crossref](#)]
247. Nadav Ben Zeev. 2017. Capital controls as shock absorbers. *Journal of International Economics* **109**, 43-67. [[Crossref](#)]
248. Atif Mian, Amir Sufi, Emil Verner. 2017. Household Debt and Business Cycles Worldwide*. *The Quarterly Journal of Economics* **132**:4, 1755-1817. [[Crossref](#)]
249. Ling Feng, Ching-Yi Lin, Chun Wang. 2017. Do Capital Flows Matter to Stock and House Prices? Evidence from China. *Emerging Markets Finance and Trade* **53**:10, 2215-2232. [[Crossref](#)]
250. Christina D. Romer, David H. Romer. 2017. New Evidence on the Aftermath of Financial Crises in Advanced Countries. *American Economic Review* **107**:10, 3072-3118. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
251. Laura Jaramillo, Carlos Mulas-Granados, Joao Tovar Jalles. 2017. Debt spikes, blind spots, and financial stress. *International Journal of Finance & Economics* **22**:4, 421-437. [[Crossref](#)]
252. Olivier Dessaint, Adrien Matray. 2017. Do managers overreact to salient risks? Evidence from hurricane strikes. *Journal of Financial Economics* **126**:1, 97-121. [[Crossref](#)]
253. Patrick Carter. 2017. Aid econometrics: Lessons from a stochastic growth model. *Journal of International Money and Finance* **77**, 216-232. [[Crossref](#)]
254. MATHIAS KLEIN. 2017. Austerity and Private Debt. *Journal of Money, Credit and Banking* **49**:7, 1555-1585. [[Crossref](#)]
255. Elliot Anenberg, Steven Laufer. 2017. A More Timely House Price Index. *The Review of Economics and Statistics* **99**:4, 722-734. [[Crossref](#)]
256. Sangyup Choi, Davide Furceri, Prakash Loungani, Saurabh Mishra, Marcos Poplawski Ribeiro. 2017. Oil Prices and Inflation Dynamics. *IMF Working Papers* **17**:196. . [[Crossref](#)]
257. Emmanouil Gkiourkas, Theodore Panagiotidis, Gianluigi Pelloni. 2017. Revisiting the macroeconomic effects of labor reallocation. *Economics Letters* **158**, 88-93. [[Crossref](#)]
258. 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](#)]
259. Alan J. Auerbach, Yuriy Gorodnichenko. 2017. Fiscal multipliers in Japan. *Research in Economics* **71**:3, 411-421. [[Crossref](#)]
260. Magdalena Kapelko, Alfons Oude Lansink, Spiro E. Stefanou. 2017. The impact of the 2008 financial crisis on dynamic productivity growth of the Spanish food manufacturing industry. An impulse response analysis. *Agricultural Economics* **48**:5, 561-571. [[Crossref](#)]
261. . Private and Public Debt **100**, . [[Crossref](#)]
262. Alexander Culiuc, Annette Kyobe. 2017. Structural Reforms and External Rebalancing. *IMF Working Papers* **17**:182. . [[Crossref](#)]
263. Sebastian K. R  th. 2017. State-dependent monetary policy transmission and financial market tensions. *Economics Letters* **157**, 56-61. [[Crossref](#)]
264. Kangni Kpodar, Chadi Abdallah. 2017. Dynamic fuel price pass-through: Evidence from a new global retail fuel price database. *Energy Economics* **66**, 303-312. [[Crossref](#)]
265. Enrico Moretti, Daniel J. Wilson. 2017. The Effect of State Taxes on the Geographical Location of Top Earners: Evidence from Star Scientists. *American Economic Review* **107**:7, 1858-1903. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]

266. Davide Furceri, João Tovar Jalles, Aleksandra Zdzenicka. 2017. China Spillovers: New Evidence from Time-Varying Estimates. *Open Economies Review* **28**:3, 413-429. [[Crossref](#)]
267. Georgios Georgiadis. 2017. To bi, or not to bi? Differences between spillover estimates from bilateral and multilateral multi-country models. *Journal of International Economics* **107**, 1-18. [[Crossref](#)]
268. Rupa Duttagupta, Futoshi Narita. 2017. Emerging and developing economies: Entering a rough patch or protracted low gear?. *Journal of Policy Modeling* **39**:4, 680-698. [[Crossref](#)]
269. Olivier Coibion, Yuriy Gorodnichenko, Lorenz Kueng, John Silvia. 2017. Innocent Bystanders? Monetary policy and inequality. *Journal of Monetary Economics* **88**, 70-89. [[Crossref](#)]
270. Antoine Goujard. 2017. Cross-Country Spillovers from Fiscal Consolidations. *Fiscal Studies* **38**:2, 219-267. [[Crossref](#)]
271. Magdalena Kapelko, Alfons Oude Lansink, Spiro E. Stefanou. 2017. Input-Specific Dynamic Productivity Change: Measurement and Application to European Dairy Manufacturing Firms. *Journal of Agricultural Economics* **68**:2, 579-599. [[Crossref](#)]
272. Christopher Biolsi. 2017. Nonlinear effects of fiscal policy over the business cycle. *Journal of Economic Dynamics and Control* **78**, 54-87. [[Crossref](#)]
273. Sheida Teimouri, Joachim Zietz. 2017. Economic costs of alternative monetary policy responses to speculative currency attacks. *Journal of International Money and Finance* **73**, 419-434. [[Crossref](#)]
274. Paul Cashin, Kamiar Mohaddes, Mehdi Raissi. 2017. Fair weather or foul? The macroeconomic effects of El Niño. *Journal of International Economics* **106**, 37-54. [[Crossref](#)]
275. João Tovar Jalles. 2017. How do fiscal adjustments change the income distribution in emerging market economies?. *International Journal of Emerging Markets* **12**:2, 310-334. [[Crossref](#)]
276. António Afonso, João Tovar Jalles. 2017. Fiscal Episodes and Market Power. *Open Economies Review* **28**:2, 233-250. [[Crossref](#)]
277. Jernej Mencinger, Aleksander Aristovnik, Miroslav Verbič. 2017. Asymmetric effects of fiscal policy in EU and OECD countries. *Economic Modelling* **61**, 448-461. [[Crossref](#)]
278. Lukas Menkhoff, Lucio Sarno, Maik Schmeling, Andreas Schrimpf. 2017. Currency Value. *Review of Financial Studies* **30**:2, 416-441. [[Crossref](#)]
279. Rabah Arezki, Valerie A. Ramey, Liugang Sheng. 2017. News Shocks in Open Economies: Evidence from Giant Oil Discoveries*. *The Quarterly Journal of Economics* **132**:1, 103-155. [[Crossref](#)]
280. António Afonso, João Tovar Jalles. 2017. The Price Relevance of Fiscal Developments. *International Economic Journal* **31**:1, 36-50. [[Crossref](#)]
281. Davide Furceri, Jun Ge, Prakash Loungani. Financial Liberalization, Inequality and Inclusion in Low-Income Countries 75-95. [[Crossref](#)]
282. Mounir Ben Mbarek, Samia Nasreen, Rochdi Feki. 2017. The contribution of nuclear energy to economic growth in France: short and long run. *Quality & Quantity* **51**:1, 219-238. [[Crossref](#)]
283. Fernando Alvarez, Francesco Lippi, Juan Passadore. 2017. Are State- and Time-Dependent Models Really Different?. *NBER Macroeconomics Annual* **31**:1, 379-457. [[Crossref](#)]
284. Stuart A. Gabriel, Chandler Lutz. 2017. The Impact of Unconventional Monetary Policy on Real Estate Markets. *SSRN Electronic Journal* . [[Crossref](#)]
285. Rosen Valchev. 2017. Bond Convenience Yields and Exchange Rate Dynamics. *SSRN Electronic Journal* . [[Crossref](#)]
286. Nadav Ben Zeev, Ohad Raveh. 2017. Monetary Policy, Fiscal Federalism, and Capital Intensity. *SSRN Electronic Journal* . [[Crossref](#)]
287. Regis Barnichon, Christian T. Brownlees. 2017. Impulse Response Estimation by Smooth Local Projections. *SSRN Electronic Journal* . [[Crossref](#)]

288. Mathias Klein. 2017. Austerity, Inequality, and Private Debt Overhang. *SSRN Electronic Journal* . [[Crossref](#)]
289. Giovanni Pellegrino. 2017. Uncertainty and Monetary Policy in the US: A Journey into Non-Linear Territory. *SSRN Electronic Journal* . [[Crossref](#)]
290. Franziska Bremus, Thomas W. Krause, Felix Noth. 2017. Bank-Specific Shocks and House Price Growth in the U.S. *SSRN Electronic Journal* . [[Crossref](#)]
291. Paul Hubert, Labondance Fabien. 2017. Central Bank Sentiment and Policy Expectations. *SSRN Electronic Journal* . [[Crossref](#)]
292. Steven M. Fazzari, James Morley, Irina B. Panovska. 2017. When Do Discretionary Changes in Government Spending or Taxes Have Larger Effects?. *SSRN Electronic Journal* . [[Crossref](#)]
293. Owen M. Zidar. 2017. Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth and Employment. *SSRN Electronic Journal* . [[Crossref](#)]
294. Markus Leibrecht, Johann Scharler. 2017. Fiscal Dynamics after a Financial Crisis: Evidence from OECD Countries. *SSRN Electronic Journal* . [[Crossref](#)]
295. Leif Brubakk, Saskia ter Ellen, Hong Xu. 2017. Forward Guidance Through Interest Rate Projections: Does It Work?. *SSRN Electronic Journal* . [[Crossref](#)]
296. Silvia Miranda-Agrippino, Giovanni Ricco. 2017. The Transmission of Monetary Policy Shocks. *SSRN Electronic Journal* . [[Crossref](#)]
297. Jonathan Bridges, Christopher Jackson, Daisy McGregor. 2017. Down in the Slumps: The Role of Credit in Five Decades of Recessions. *SSRN Electronic Journal* . [[Crossref](#)]
298. Kiyotaka Nakashima, Masahiko Shibamoto, Koji Takahashi. 2017. Identifying Unconventional Monetary Policy Shocks. *SSRN Electronic Journal* . [[Crossref](#)]
299. Andrei S. Gonnalves. 2017. Can Reinvestment Risk Explain the Dividend and Bond Term Structures?. *SSRN Electronic Journal* . [[Crossref](#)]
300. Yu-Fan Huang. 2017. Dynamic Responses of Real Output to Financial Spreads. *SSRN Electronic Journal* . [[Crossref](#)]
301. Regis Barnichon, Christian Matthes. 2017. Understanding the Size of the Government Spending Multiplier: It's in the Sign. *SSRN Electronic Journal* . [[Crossref](#)]
302. Atsushi Sekine, Takayuki Tsuruga. 2017. Effects of Commodity Price Shocks on Inflation: A Cross-Country Analysis. *SSRN Electronic Journal* . [[Crossref](#)]
303. Daniele Bianchi. 2017. Carry Trades and Tail Risk: Evidence from Commodity Markets. *SSRN Electronic Journal* . [[Crossref](#)]
304. Kiyotaka Nakashima, Masahiko Shibamoto, Koji Takahashi. 2017. Risk-Taking Channel of Unconventional Monetary Policies in Bank Lending. *SSRN Electronic Journal* . [[Crossref](#)]
305. Saleem Bahaj, Frederic Malherbe. 2017. A Positive Analysis of Bank Behavior Under Capital Requirements. *SSRN Electronic Journal* . [[Crossref](#)]
306. Elisabeth Falck, Mathias Hoffmann, Patrick HHrtgen. 2017. Disagreement and Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
307. Ivan Ivanov, Tom Zimmermann. 2017. Claim Dilution in the Municipal Debt Market. *SSRN Electronic Journal* . [[Crossref](#)]
308. Vegard Larsen, Leif Anders Thorsrud. 2017. Asset Returns, News Topics, and Media Effects. *SSRN Electronic Journal* . [[Crossref](#)]
309. Thorsten Franz. 2017. Monetary Policy, Housing, and Collateral Constraints. *SSRN Electronic Journal* . [[Crossref](#)]

310. Carlo Wix. 2017. The Long-Run Real Effects of Banking Crises: Firm-Level Investment Dynamics and the Role of Wage Rigidity. *SSRN Electronic Journal* . [[Crossref](#)]
311. Ambrogio Cesa-Bianchi, Andrea Ferrero, Alessandro Rebucci. 2017. International Credit Supply Shocks. *SSRN Electronic Journal* . [[Crossref](#)]
312. Luca Gerotto, Antonio Paradiso. 2017. Expectations and Uncertainty: A Common-Source Infection Model for Selected European Countries. *SSRN Electronic Journal* . [[Crossref](#)]
313. Knut Are Aastveit, Andrr K. Anundsen. 2017. Asymmetric Effects of Monetary Policy in Regional Housing Markets. *SSRN Electronic Journal* . [[Crossref](#)]
314. Yeo Joon Yoon, Jonghyuk Kim, Hyuk Ju Kwon, Wongi Kim. 2017. : (Trump Administration's Trade Policy Toward China). *SSRN Electronic Journal* . [[Crossref](#)]
315. Matthew Hall, Aditi Thapar. 2017. The Economic Effects of Government Spending. *SSRN Electronic Journal* . [[Crossref](#)]
316. Yunyun Lv. 2017. Selection of Macroeconomic Forecasting Models: One Size Fits All?. *Theoretical Economics Letters* **07**:04, 643-682. [[Crossref](#)]
317. Stefania Fabrizio, Davide Furceri, Rodrigo Garcia-Verdu, Bin Grace Li, Sandra Lizarazo Ruiz, Marina Mendes Tavares, Futoshi Narita, Adrian Peralta-Alva. 2017. Macro-Structural Policies and Income Inequality in Low-Income Developing Countries. *Staff Discussion Notes* **17**:01, 1. [[Crossref](#)]
318. Sanjeev Gupta, João Tovar Jalles, Carlos Mulas-Granados, Michela Schena. 2017. Governments and Promised Fiscal Consolidations: Do They Mean What They Say?. *IMF Working Papers* **17**:39, 1. [[Crossref](#)]
319. Daniel Leigh, Weicheng Lian, Marcos Poplawski-Ribeiro, Rachel Szymanski, Viktor Tsyrennikov, Hong Yang. 2017. Exchange Rates and Trade: A Disconnect?. *IMF Working Papers* **17**:58, 1. [[Crossref](#)]
320. Marco Bernardini, Lorenzo Forni. 2017. Private and Public Debt: Are Emerging Markets at Risk?. *IMF Working Papers* **17**:61, 1. [[Crossref](#)]
321. Antonio David. 2017. Fiscal Policy Effectiveness in a Small Open Economy: Estimates of Tax and Spending Multipliers in Paraguay. *IMF Working Papers* **17**:63, 1. [[Crossref](#)]
322. Gustavo Adler, Romain Duval, Davide Furceri, Sinem Kiliç Çelik, Ksenia Koloskova, Marcos Poplawski-Ribeiro. 2017. Gone with the Headwinds: Global Productivity. *Staff Discussion Notes* **17**:04, 1. [[Crossref](#)]
323. Christian Ebeke. 2017. Who Dares, Wins: Labor Market Reforms and Sovereign Yields. *IMF Working Papers* **17**:141, 1. [[Crossref](#)]
324. Tigran Poghosyan. 2017. Cross-Country Spillovers of Fiscal Consolidations in the Euro Area. *IMF Working Papers* **17**:140, 1. [[Crossref](#)]
325. International Monetary Fund.. 2017. Brazil: Selected Issues. *IMF Staff Country Reports* **17**:216, 1. [[Crossref](#)]
326. Patrick Blagrove, Giang Ho, Ksenia Koloskova, Esteban Vesperoni. 2017. Fiscal Spillovers: The Importance of Macroeconomic and Policy Conditions in Transmission. *Spillover Notes* **17**:02, 1. [[Crossref](#)]
327. Davide Furceri, Bin Grace Li. 2017. The Macroeconomic (and Distributional) Effects of Public Investment in Developing Economies. *IMF Working Papers* **17**:217, 1. [[Crossref](#)]
328. Nina Biljanovska, Francesco Grigoli, Martina Hengge. 2017. Fear Thy Neighbor: Spillovers from Economic Policy Uncertainty. *IMF Working Papers* **17**:240, 1. [[Crossref](#)]
329. Mario Catalan, Alexander Hoffmaister, Cicilia Anggadewi Harun. 2017. Bank Capital and Lending: An Extended Framework and Evidence of Nonlinearity. *IMF Working Papers* **17**:252, 1. [[Crossref](#)]

330. Era Dabla-Norris, Pietro Dallari, Tigran Poghosyan. 2017. Fiscal Spillovers in the Euro Area: Letting the Data Speak. *IMF Working Papers* 17:241, 1. [[Crossref](#)]
331. Sergei Antoshin, Marco Arena, Nikolay Gueorguiev, Tonny Lybek, John Ralyea, Etienne Yehoue. 2017. Credit Growth and Economic Recovery in Europe After the Global Financial Crisis. *IMF Working Papers* 17:256, 1. [[Crossref](#)]
332. Tim Alexander Kroencke, Maik Schmeling, Andreas Schrimpf. 2017. The FOMC Risk Shift. *SSRN Electronic Journal* . [[Crossref](#)]
333. Abdul Abiad (ADB), Davide Furceri (IMF and University of Palermo), Petia Topalova (IMF). 2016. The macroeconomic effects of public investment: Evidence from advanced economies. *Journal of Macroeconomics* 50, 224-240. [[Crossref](#)]
334. M. Iqbal Ahmed, Steven P. Cassou. 2016. Does consumer confidence affect durable goods spending during bad and good economic times equally?. *Journal of Macroeconomics* 50, 86-97. [[Crossref](#)]
335. Boele Bonthuis, Valerie Jarvis, Juuso Vanhala. 2016. Shifts in euro area Beveridge curves and their determinants. *IZA Journal of Labor Policy* 5:1. . [[Crossref](#)]
336. Ryan Banerjee, Michael B. Devereux, Giovanni Lombardo. 2016. Self-oriented monetary policy, global financial markets and excess volatility of international capital flows. *Journal of International Money and Finance* 68, 275-297. [[Crossref](#)]
337. John G. Fernald, J. Christina Wang. 2016. Why Has the Cyclicalities of Productivity Changed? What Does It Mean?. *Annual Review of Economics* 8:1, 465-496. [[Crossref](#)]
338. Christina D. Romer, David H. Romer. 2016. Transfer Payments and the Macroeconomy: The Effects of Social Security Benefit Increases, 1952–1991. *American Economic Journal: Macroeconomics* 8:4, 1-42. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
339. Silvana Tenreiro, Gregory Thwaites. 2016. Pushing on a String: US Monetary Policy Is Less Powerful in Recessions. *American Economic Journal: Macroeconomics* 8:4, 43-74. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
340. James Cloyne, Patrick Hürtgen. 2016. The Macroeconomic Effects of Monetary Policy: A New Measure for the United Kingdom. *American Economic Journal: Macroeconomics* 8:4, 75-102. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
341. Sheida Teimouri, Nabamita Dutta. 2016. Investment and bank credit recovery after banking crises. *Journal of Financial Stability* 26, 306-327. [[Crossref](#)]
342. Ludger Linnemann, Roland Winkler. 2016. Estimating nonlinear effects of fiscal policy using quantile regression methods. *Oxford Economic Papers* 68:4, 1120-1145. [[Crossref](#)]
343. Manuel Funke, Moritz Schularick, Christoph Trebesch. 2016. Going to extremes: Politics after financial crises, 1870–2014. *European Economic Review* 88, 227-260. [[Crossref](#)]
344. Syed M. Hussain, Samreen Malik. 2016. Asymmetric Effects of Exogenous Tax Changes. *Journal of Economic Dynamics and Control* 69, 268-300. [[Crossref](#)]
345. Davide Furceri, Prakash Loungani, John Simon, Susan M. Wachter. 2016. Global food prices and domestic inflation: some cross-country evidence. *Oxford Economic Papers* 68:3, 665-687. [[Crossref](#)]
346. Pablo Hernández de Cos, Enrique Moral-Benito. 2016. Fiscal multipliers in turbulent times: the case of Spain. *Empirical Economics* 50:4, 1589-1625. [[Crossref](#)]
347. Alexandra Jarotschkin, Aart Kraay. 2016. Aid, Disbursement Delays, and the Real Exchange Rate. *IMF Economic Review* 64:2, 217-238. [[Crossref](#)]
348. François Gourio, Todd Messer, Michael Siemer. 2016. Firm Entry and Macroeconomic Dynamics: A State-Level Analysis. *American Economic Review* 106:5, 214-218. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]

349. Alan J Auerbach, Yuriy Gorodnichenko. 2016. Effects of Fiscal Shocks in a Globalized World. *IMF Economic Review* **64**:1, 177-215. [[Crossref](#)]
350. ###, ###. 2016. Downward Nominal Wage Rigidity and Asymmetric Effects of Monetary Policy. *Review of International Money and Finance* **6**:1, 5-31. [[Crossref](#)]
351. Mauricio Villamizar-Villegas. 2016. IDENTIFYING THE EFFECTS OF SIMULTANEOUS MONETARY POLICY SHOCKS. *Contemporary Economic Policy* **34**:2, 268-296. [[Crossref](#)]
352. Òscar Jordà, Alan M. Taylor. 2016. The Time for Austerity: Estimating the Average Treatment Effect of Fiscal Policy. *The Economic Journal* **126**:590, 219-255. [[Crossref](#)]
353. Òscar Jordà, Moritz Schularick, Alan M. Taylor. 2016. SOVEREIGNS VERSUS BANKS: CREDIT, CRISES, AND CONSEQUENCES. *Journal of the European Economic Association* **14**:1, 45-79. [[Crossref](#)]
354. Şebnem Kalemli-Özcan, Carmen Reinhart, Kenneth Rogoff. 2016. SOVEREIGN DEBT AND FINANCIAL CRISES: THEORY AND HISTORICAL EVIDENCE. *Journal of the European Economic Association* **14**:1, 1-6. [[Crossref](#)]
355. António Afonso, João Tovar Jalles. 2016. Markups' cyclical behaviour: the role of demand and supply shocks. *Applied Economics Letters* **23**:1, 1-5. [[Crossref](#)]
356. V.A. Ramey. Macroeconomic Shocks and Their Propagation 71-162. [[Crossref](#)]
357. Alexander S. Semenov, Ekaterina A. Eremeeva. 2016. The problem of development of entrepreneurship and entrepreneurial education in Russia. *SHS Web of Conferences* **29**, 02034. [[Crossref](#)]
358. Vivian Hwa, Pavel S. Kapinos, Carlos D. Ramirez. 2016. Does Regulatory Bank Oversight Impact Economic Activity? A Local Projections Approach. *SSRN Electronic Journal* . [[Crossref](#)]
359. Saleem Bahaj, Jonathan Bridges, Frederic Malherbe, Cian O'Neill. 2016. What Determines How Banks Respond to Changes in Capital Requirements?. *SSRN Electronic Journal* . [[Crossref](#)]
360. Piergiorgio Alessandri, Antonio Maria Conti, Fabrizio Venditti. 2016. The Financial Stability Dark Side of Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
361. Sandra Eickmeier, Norbert Metiu, Esteban Prieto. 2016. Time-Varying Volatility, Financial Intermediation and Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
362. Mihhly Tamms Borsi. 2016. Credit Contractions and Unemployment. *SSRN Electronic Journal* . [[Crossref](#)]
363. David Aikman, Oliver Bush, Alan M. Taylor. 2016. Monetary versus Macroprudential Policies Causal Impacts of Interest Rates and Credit Controls in the Era of the UK Radcliffe Report. *SSRN Electronic Journal* . [[Crossref](#)]
364. Antonio Afonso, Joao Tovar Jalles. 2016. The Fiscal Consequences of Deflation: Evidence from the Golden Age of Globalization. *SSRN Electronic Journal* . [[Crossref](#)]
365. Massimo Ferrari, Jonathan Kearns. 2016. Monetary Shocks at High-Frequency and Their Changing FX Transmission Around the Globe. *SSRN Electronic Journal* . [[Crossref](#)]
366. Ambrogio Cesa-Bianchi, Gregory Thwaites. 2016. Monetary Policy Transmission in an Open Economy: New Data and Evidence from the United Kingdom. *SSRN Electronic Journal* . [[Crossref](#)]
367. Mihhly Tamms Borsi. 2016. Fiscal Multipliers Across the Credit Cycle. *SSRN Electronic Journal* . [[Crossref](#)]
368. Giovanni Caggiano, Efrem Castelnuovo, Antoine Parent, Giovanni Pellegrino. 2016. Liquidity Traps and Large-Scale Financial Crises. *SSRN Electronic Journal* . [[Crossref](#)]
369. Ana Lamo, Enrique Moral-Benito, Javier J. Perez. 2016. Does Slack Influence Public and Private Labour Market Interactions?. *SSRN Electronic Journal* . [[Crossref](#)]

370. Sangyup Choi, Myungkyu Shim. 2016. Financial vs. Policy Uncertainty in Emerging Economies: Evidence from Korea. *SSRN Electronic Journal* . [[Crossref](#)]
371. Wataru Miyamoto, Thuy Lan Nguyen. 2016. Government Spending Multipliers Under the Zero Lower Bound: Evidence from Japan. *SSRN Electronic Journal* . [[Crossref](#)]
372. Mathias Klein. 2016. Austerity and Private Debt. *SSRN Electronic Journal* . [[Crossref](#)]
373. Sheida Teimouri, Joachim Zietz. 2016. Economic Costs of Alternative Monetary Policy Responses to Speculative Currency Attacks. *SSRN Electronic Journal* . [[Crossref](#)]
374. Tamon Asonuma, Marcos Chamon, Akira Sasahara. 2016. Trade Costs of Sovereign Debt Restructurings: Does a Market-Friendly Approach Improve the Outcome?. *SSRN Electronic Journal* . [[Crossref](#)]
375. Carolin E. Pflueger. 2016. Precautionary Savings in Stocks and Bonds. *SSRN Electronic Journal* . [[Crossref](#)]
376. Joshua R. Hendrickson. 2016. Interest on Reserves, Settlement, and the Effectiveness of Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
377. Ugo Albertazzi. 2016. The Bank Lending Channel of Conventional and Unconventional Monetary Policy. *SSRN Electronic Journal* . [[Crossref](#)]
378. Eduardo A. Cavallo, Barry Eichengreen, Ugo Panizza. 2016. Can Countries Rely on Foreign Saving for Investment and Economic Development?. *SSRN Electronic Journal* . [[Crossref](#)]
379. Gong Cheng, Aitor Erce. 2016. The Macroeconomic Effects of Official Debt Restructuring: Evidence from the Paris Club. *SSRN Electronic Journal* . [[Crossref](#)]
380. Peter Gal, Alexander Hijzen. 2016. The Short-Term Impact of Product Market Reforms: A cross-country firm-level analysis. *IMF Working Papers* 16:116, 1. [[Crossref](#)]
381. Vitor Gaspar, Maurice Obstfeld, Ratna Sahay, Douglas Laxton. 2016. Macroeconomic Management When Policy Space is Constrained: A Comprehensive, Consistent and Coordinated Approach to Economic Policy. *Staff Discussion Notes* 16:09, 1. [[Crossref](#)]
382. Davide Furceri, João Tovar Jalles, Aleksandra Zdzenicka. 2016. China Spillovers: New Evidence From Time-Varying Estimates. *Spillover Notes* 16:07, 1. [[Crossref](#)]
383. International Monetary Fund. 2016. West African Economic and Monetary Union (WAEMU): Selected Issues. *IMF Staff Country Reports* 16:98, 1. [[Crossref](#)]
384. Tamon Asonuma, Marcos Chamon, Akira Sasahara. 2016. Trade Costs of Sovereign Debt Restructurings: Does a Market-Friendly Approach Improve the Outcome?. *IMF Working Papers* 16:222, 1. [[Crossref](#)]
385. Yan Carriere-Swallow, Bertrand Gruss, Nicolas Magud, Fabian Valencia. 2016. Monetary Policy Credibility and Exchange Rate Pass-Through. *IMF Working Papers* 16:240, 1. [[Crossref](#)]
386. Kangni Kpodar, Chadi Abdallah. 2016. Dynamic Fuel Price Pass-Through: Evidence from a New Global Retail Fuel Price Database. *IMF Working Papers* 16:254, 1. [[Crossref](#)]
387. Romain Bouis, Romain Duval, Johannes Eugster. 2016. Product Market Deregulation and Growth: New Country-Industry-Level Evidence. *IMF Working Papers* 16:114, 1. [[Crossref](#)]
388. Aqib Aslam, Samya Beidas-Strom, Rudolfs Bems, Oya Celasun, Zsoka Koczan. 2016. Trading on Their Terms? Commodity Exporters in the Aftermath of the Commodity Boom. *IMF Working Papers* 16:27, 1. [[Crossref](#)]
389. Francesca Caselli, Agustin Roitman. 2016. Non-Linear Exchange Rate Pass-Through in Emerging Markets. *IMF Working Papers* 16:1, 1. [[Crossref](#)]
390. Anna Bordon, Christian Ebeke, Kazuko Shirono. 2016. When Do Structural Reforms Work? On the Role of the Business Cycle and Macroeconomic Policies. *IMF Working Papers* 16:62, 1. [[Crossref](#)]

391. Sangyup Choi, Prakash Loungani. 2015. Uncertainty and unemployment: The effects of aggregate and sectoral channels. *Journal of Macroeconomics* **46**, 344-358. [[Crossref](#)]
392. Òscar Jordà, Moritz Schularick, Alan M. Taylor. 2015. Leveraged bubbles. *Journal of Monetary Economics* **76**, S1-S20. [[Crossref](#)]
393. Irineu de Carvalho Filho. 2015. Risk-Off Episodes and Swiss Franc Appreciation: The Role of Capital Flows. *German Economic Review* **16**:4, 439-463. [[Crossref](#)]
394. ###. 2015. Nonlinear Transmission of Stock-Index Returns among Equity Markets of US, Japan, China and Korea. *The Journal of International Trade & Commerce* **11**:5, 195-217. [[Crossref](#)]
395. Ghulam Awais Rana, Paul Shea. 2015. Estimating the causal relationship between foreclosures and unemployment during the great recession. *Economics Letters* **134**, 90-93. [[Crossref](#)]
396. Nadav Ben Zeev, Evi Pappa. 2015. Multipliers of unexpected increases in defense spending: An empirical investigation. *Journal of Economic Dynamics and Control* **57**, 205-226. [[Crossref](#)]
397. Alan M. Taylor. 2015. Credit, Financial Stability, and the Macroeconomy. *Annual Review of Economics* **7**:1, 309-339. [[Crossref](#)]
398. Wojciech Charemza, Svetlana Makarova, Imran Shah. 2015. Making the most of high inflation. *Applied Economics* **47**:34-35, 3723-3739. [[Crossref](#)]
399. Òscar Jordà, Moritz Schularick, Alan M. Taylor. 2015. Betting the house. *Journal of International Economics* **96**, S2-S18. [[Crossref](#)]
400. Magdalena Kapelko, Alfons Oude Lansink, Spiro E. Stefanou. 2015. Analyzing the impact of investment spikes on dynamic productivity growth. *Omega* **54**, 116-124. [[Crossref](#)]
401. Alberto Alesina, Omar Barbiero, Carlo Favero, Francesco Giavazzi, Matteo Paradisi. 2015. Austerity in 2009-13. *Economic Policy* **30**:83, 383-437. [[Crossref](#)]
402. Bruno T. da Rocha, Solomos Solomou. 2015. The effects of systemic banking crises in the inter-war period. *Journal of International Money and Finance* **54**, 35-49. [[Crossref](#)]
403. Wongi Kim. 2015. Do government spending multipliers depend on the level of government debt? US historical data evidence. *Applied Economics Letters* **22**:8, 668-672. [[Crossref](#)]
404. Reinout De Bock, Irineu de Carvalho Filho. 2015. The behavior of currencies during risk-off episodes. *Journal of International Money and Finance* **53**, 218-234. [[Crossref](#)]
405. N. Crafts, T. C. Mills. 2015. Self-defeating austerity? Evidence from 1930s' Britain. *European Review of Economic History* **19**:2, 109-127. [[Crossref](#)]
406. Giovanni Caggiano, Efrem Castelnuovo, Valentina Colombo, Gabriela Nodari. 2015. Estimating Fiscal Multipliers: News from a Non-linear World. *The Economic Journal* **125**:584, 746-776. [[Crossref](#)]
407. Daniel Riera-Crichton, Carlos A. Vegh, Guillermo Vuletin. 2015. Procyclical and countercyclical fiscal multipliers: Evidence from OECD countries. *Journal of International Money and Finance* **52**, 15-31. [[Crossref](#)]
408. Giovanni Favara, Jean Imbs. 2015. Credit Supply and the Price of Housing. *American Economic Review* **105**:3, 958-992. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
409. Sheida Teimouri, Taggart J Brooks. 2015. Output Recovery After Currency Crises. *Comparative Economic Studies* **57**:1, 75-102. [[Crossref](#)]
410. Boele Bonthuis, Valerie Jarvis, Juuso Vanhala. 2015. Shifts in Euro Area Beveridge Curves and Their Determinants. *SSRN Electronic Journal* . [[Crossref](#)]
411. Sally Chen, Minsuk Kim, Marijn Otte, Kevin Wiseman, Aleksandra Zdzenicka. 2015. Private Sector Deleveraging and Growth Following Busts. *SSRN Electronic Journal* . [[Crossref](#)]
412. Shafik Hebous, Tom Zimmermann. 2015. Revisiting the Narrative Approach of Estimating Tax Multipliers. *SSRN Electronic Journal* . [[Crossref](#)]

413. Antonio Afonso, Joao Tovar Jalles. 2015. Markupss Cyclical Behavior: The Role of Demand and Supply Shocks. *SSRN Electronic Journal* . [[Crossref](#)]
414. Antonio Afonso, Joao Tovar Jalles. 2015. Fiscal Episodes, Technological Progress and Market Power. *SSRN Electronic Journal* . [[Crossref](#)]
415. Ryan Banerjee, Hitoshi Mio. 2015. The Impact of Liquidity Regulation on Banks. *SSRN Electronic Journal* . [[Crossref](#)]
416. Elena Deryugina, Alexey A. Ponomarenko, Andrey Sinyakov, Constantine Sorokin. 2015. Evaluating Underlying Inflation Measures for Russia. *SSRN Electronic Journal* . [[Crossref](#)]
417. Atif R. Mian, Amir Sufi, Emil Verner. 2015. Household Debt and Business Cycles Worldwide. *SSRN Electronic Journal* . [[Crossref](#)]
418. Nicholas Butt, Rohan Churm, Michael F. McMahon, Arpad Morotz, Jochen F. Schanz. 2015. QE and the Bank Lending Channel in the United Kingdom. *SSRN Electronic Journal* . [[Crossref](#)]
419. Antonio Afonso, Joao Tovar Jalles. 2015. The Price Relevance of Fiscal Developments. *SSRN Electronic Journal* . [[Crossref](#)]
420. Aitor Erce, Daniel Riera-Crichton. 2015. Catalytic IMF? A Gross Flows Approach. *SSRN Electronic Journal* . [[Crossref](#)]
421. Abdul Abiad, Davide Furceri, Petia Topalova. 2015. The Macroeconomic Effects of Public Investment: Evidence from Advanced Economies. *IMF Working Papers* 15:95, 1. [[Crossref](#)]
422. Sally Chen, Minsuk Kim, Marijn Otte, Kevin Wiseman, Aleksandra Zdzienicka. 2015. Private Sector Deleveraging and Growth Following Busts. *IMF Working Papers* 15:35, 1. [[Crossref](#)]
423. Era Dabla-Norris, Si Guo, Vikram Haksar, Minsuk Kim, Kalpana Kochhar, Kevin Wiseman, Aleksandra Zdzienicka. 2015. The New Normal: A Sector-level Perspective on Productivity Trends in Advanced Economies. *Staff Discussion Notes* 15:3, 1. [[Crossref](#)]
424. Davide Furceri, Prakash Loungani, John Simon, Susan Wachter. 2015. Global Food Prices and Domestic Inflation: Some Cross-Country Evidence. *IMF Working Papers* 15:133, 1. [[Crossref](#)]
425. Vincent Belinga, Constant Lonkeng Ngouana. 2015. (Not) Dancing Together: Monetary Policy Stance and the Government Spending Multiplier. *IMF Working Papers* 15:114, 1. [[Crossref](#)]
426. Pablo Anaya, Alex Pienkowski. 2015. What Really Drives Public Debt: A Holistic Approach. *IMF Working Papers* 15:137, 1. [[Crossref](#)]
427. Livia Chițu, Barry Eichengreen, Arnaud Mehl. 2014. When did the dollar overtake sterling as the leading international currency? Evidence from the bond markets. *Journal of Development Economics* 111, 225-245. [[Crossref](#)]
428. Emiliano Santoro, Ivan Petrella, Damjan Pfajfar, Edoardo Gaffeo. 2014. Loss aversion and the asymmetric transmission of monetary policy. *Journal of Monetary Economics* 68, 19-36. [[Crossref](#)]
429. Aart Kraay. 2014. Government Spending Multipliers in Developing Countries: Evidence from Lending by Official Creditors. *American Economic Journal: Macroeconomics* 6:4, 170-208. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
430. Neville Francis, Michael T. Owyang, Jennifer E. Roush, Riccardo DiCecio. 2014. A Flexible Finite-Horizon Alternative to Long-Run Restrictions with an Application to Technology Shocks. *Review of Economics and Statistics* 96:4, 638-647. [[Crossref](#)]
431. Andrey Stoyanov, Nikolay Zubanov. 2014. The distribution of the gains from spillovers through worker mobility between workers and firms. *European Economic Review* 70, 17-35. [[Crossref](#)]
432. Claudio Borio, Mathias Drehmann, Kostas Tsatsaronis. 2014. Stress-testing macro stress testing: Does it live up to expectations?. *Journal of Financial Stability* 12, 3-15. [[Crossref](#)]

433. Ryan R. Brady. 2014. The spatial diffusion of regional housing prices across U.S. states. *Regional Science and Urban Economics* 46, 150-166. [[Crossref](#)]
434. Coen N. Teulings, Nikolay Zubanov. 2014. IS ECONOMIC RECOVERY A MYTH? ROBUST ESTIMATION OF IMPULSE RESPONSES. *Journal of Applied Econometrics* 29:3, 497-514. [[Crossref](#)]
435. Piyachart Phiromswad. 2014. Measuring monetary policy with empirically grounded identifying restrictions. *Empirical Economics* 46:2, 681-699. [[Crossref](#)]
436. 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](#)]
437. David Rezza Baqaee. 2014. Asymmetric Inflation Expectations, Downward Rigidity of Wages, and Asymmetric Business Cycles. *SSRN Electronic Journal* . [[Crossref](#)]
438. Liudas Giraitis, George Kapetanios, Konstantinos Theodoridis, Tony Yates. 2014. Estimating Time-Varying DSGE Models Using Minimum Distance Methods. *SSRN Electronic Journal* . [[Crossref](#)]
439. Nicholas Butt, Rohan Churm, Michael F. McMahon, Arpad Morotz, Jochen F. Schanz. 2014. QE and the Bank Lending Channel in the United Kingdom. *SSRN Electronic Journal* . [[Crossref](#)]
440. GGkhan Cebiroglu, Nikolaus Hautsch, Ulrich Horst. 2014. Order Exposure and Liquidity Coordination: Does Hidden Liquidity Harm Price Efficiency?. *SSRN Electronic Journal* . [[Crossref](#)]
441. Christopher A. Martin. 2014. Foreign Treasury Purchases and the Yield Curve: Evidence from a Sign-Identified Vector Autoregression. *SSRN Electronic Journal* . [[Crossref](#)]
442. IMF. Research Dept.. World Economic Outlook, April 2014: Recovery Strengthens, Remains Uneven . [[Crossref](#)]
443. International Monetary Fund. World Economic Outlook, October 2014: Legacies, Clouds, Uncertainties . [[Crossref](#)]
444. Salvatore Dell'Erba, Marcos Poplawski-Ribeiro, Ksenia Koloskova. 2014. Medium-Term Fiscal Multipliers during Protracted Recessions. *IMF Working Papers* 14:213, 1. [[Crossref](#)]
445. Marcel Gorenflo. 2013. Futures price dynamics of CO2 emission allowances. *Empirical Economics* 45:3, 1025-1047. [[Crossref](#)]
446. ÒSCAR JORDÀ, MORITZ SCHULARICK, ALAN M. TAYLOR. 2013. When Credit Bites Back. *Journal of Money, Credit and Banking* 45:s2, 3-28. [[Crossref](#)]
447. Lorenzo E. Bernal-Verdugo, Davide Furceri, Dominique Guillaume. 2013. Banking crises, labor reforms, and unemployment. *Journal of Comparative Economics* 41:4, 1202-1219. [[Crossref](#)]
448. Michael Eichler. 2013. Causal inference with multiple time series: principles and problems. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 371:1997, 20110613. [[Crossref](#)]
449. Jessamyn Schaller. 2013. For richer, if not for poorer? Marriage and divorce over the business cycle. *Journal of Population Economics* 26:3, 1007-1033. [[Crossref](#)]
450. Gerald A. Carlino, Robert P. Inman. 2013. Local deficits and local jobs: Can US states stabilize their own economies?. *Journal of Monetary Economics* 60:5, 517-530. [[Crossref](#)]
451. W. Erno Kuiper, Alfons G.J.M. Oude Lansink. 2013. Asymmetric Price Transmission in Food Supply Chains: Impulse Response Analysis by Local Projections Applied to U.S. Broiler and Pork Prices. *Agribusiness* 29:3, 325-343. [[Crossref](#)]
452. Michael T. Owyang,, Valerie A. Ramey,, Sarah Zubairy. 2013. Are Government Spending Multipliers Greater during Periods of Slack? Evidence from Twentieth-Century Historical Data. *American Economic Review* 103:3, 129-134. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
453. Valerie Ramey. 2013. Comment. *NBER Macroeconomics Annual* 27:1, 147-153. [[Crossref](#)]

454. 2013. Discussion. *NBER Macroeconomics Annual* **27**:1, 154-157. [[Crossref](#)]
455. Michael Owyang, Valerie A. Ramey, Sarah Zubairy. 2013. Are Government Spending Multipliers Greater During Periods of Slack? Evidence from 20th Century Historical Data. *SSRN Electronic Journal* . [[Crossref](#)]
456. Gerald A. Carlino, Robert P. Inman. 2013. Local Deficits and Local Jobs: Can U.S. States Stabilize Their Own Economies?. *SSRN Electronic Journal* . [[Crossref](#)]
457. Roberta Distanto, Ivan Petrella, Emiliano Santoro. 2013. Asymmetry Reversals and the Business Cycle. *SSRN Electronic Journal* . [[Crossref](#)]
458. Gökhan Cebiroglu, Nikolaus Hautsch, Ulrich Horst. 2013. Does Hidden Liquidity Harm Price Efficiency? Equilibrium Exposure under Latent Demand. *SSRN Electronic Journal* . [[Crossref](#)]
459. Osborne Jackson. 2013. Natural Disasters, Foreign Aid, and Economic Growth. *SSRN Electronic Journal* . [[Crossref](#)]
460. Yoon-Jin Lee, Ryo Okui, Mototsugu Shintani. 2013. Asymptotic Inference for Dynamic Panel Estimators of Infinite Order Autoregressive Processes. *SSRN Electronic Journal* . [[Crossref](#)]
461. Douglas Sutherland, Peter Hoeller. 2013. Growth-Promoting Policies and Macroeconomic Stability. *SSRN Electronic Journal* . [[Crossref](#)]
462. Antoine Goujard. 2013. Cross-Country Spillovers from Fiscal Consolidations. *SSRN Electronic Journal* . [[Crossref](#)]
463. Olivier Dessaint, Adrien Matray. 2013. Do Managers Overreact to Salient Risks? Evidence from Hurricane Strikes. *SSRN Electronic Journal* . [[Crossref](#)]
464. Oscar Jorda, Moritz Schularick, Alan M. Taylor. 2013. Sovereigns Versus Banks: Credit, Crises and Consequences. *SSRN Electronic Journal* . [[Crossref](#)]
465. Laurence M. Ball, Davide Furceri, Daniel Leigh, Prakash Loungani. 2013. The Distributional Effects of Fiscal Consolidation. *IMF Working Papers* **13**:151, 1. [[Crossref](#)]
466. International Monetary Fund. 2013. Guinea-Bissau: Staff Report for the 2013 Article IV Consultation; Debt Sustainability Analysis; Informational Annex; Public Information Notice on the Executive Board Discussion; and Statement by the Executive Director for Guinea-Bissau. *IMF Staff Country Reports* **13**:197, 1. [[Crossref](#)]
467. Nicolas Arregui, Jaromir Benes, Ivo Krznar, Srobona Mitra, Andre Santos. 2013. Evaluating the Net Benefits of Macroprudential Policy: A Cookbook. *IMF Working Papers* **13**:167, i. [[Crossref](#)]
468. Lorenzo E. Bernal-Verdugo, Davide Furceri, Dominique M. Guillaume. 2013. The Dynamic Effect of Social and Political Instability on Output: The Role of Reforms. *IMF Working Papers* **13**:91, 1. [[Crossref](#)]
469. Elmar Mertens. 2012. Are spectral estimators useful for long-run restrictions in SVARs?. *Journal of Economic Dynamics and Control* **36**:12, 1831-1844. [[Crossref](#)]
470. Davide Furceri, Stéphanie Guichard, Elena Rusticelli. 2012. The effect of episodes of large capital inflows on domestic credit. *The North American Journal of Economics and Finance* **23**:3, 325-344. [[Crossref](#)]
471. Davide Furceri, Aleksandra Zdzienicka. 2012. Banking Crises and Short and Medium Term Output Losses in Emerging and Developing Countries: The Role of Structural and Policy Variables. *World Development* **40**:12, 2369-2378. [[Crossref](#)]
472. Davide Furceri, Aleksandra Zdzienicka. 2012. The Consequences of Banking Crises for Public Debt. *International Finance* **15**:3, 289-307. [[Crossref](#)]

473. Mark J. Holmes, Jesús Otero, Theodore Panagiotidis. 2012. PPP in OECD Countries: An Analysis of Real Exchange Rate Stationarity, Cross-Sectional Dependency and Structural Breaks. *Open Economies Review* **23**:5, 767-783. [[Crossref](#)]
474. Alastair R. Hall, Atsushi Inoue, James M. Nason, Barbara Rossi. 2012. Information criteria for impulse response function matching estimation of DSGE models. *Journal of Econometrics* **170**:2, 499-518. [[Crossref](#)]
475. ##, ###. 2012. The Impact of Uncertainty on Economic Growth. *KUKJE KYUNGJE YONGU* **18**:3, 129-151. [[Crossref](#)]
476. Davide Furceri, Aleksandra Zdzenicka. 2012. How costly are debt crises?. *Journal of International Money and Finance* **31**:4, 726-742. [[Crossref](#)]
477. Rokon Bhuiyan. 2012. The Effects of Monetary Policy Shocks in Bangladesh: A Bayesian Structural VAR Approach. *International Economic Journal* **26**:2, 301-316. [[Crossref](#)]
478. Alfred A. Haug, Christie Smith. 2012. Local Linear Impulse Responses for a Small Open Economy*. *Oxford Bulletin of Economics and Statistics* **74**:3, 470-492. [[Crossref](#)]
479. Yanping Chong, Òscar Jordà, Alan M. Taylor. 2012. THE HARROD-BALASSA-SAMUELSON HYPOTHESIS: REAL EXCHANGE RATES AND THEIR LONG-RUN EQUILIBRIUM*. *International Economic Review* **53**:2, 609-634. [[Crossref](#)]
480. Young-Jae Chang. 2012. Estimation of Nonlinear Impulse Responses of Stock Indices by Asset Class. *Korean Journal of Applied Statistics* **25**:2, 239-249. [[Crossref](#)]
481. Andrey Stoyanov,, Nikolay Zubanov. 2012. Productivity Spillovers Across Firms through Worker Mobility. *American Economic Journal: Applied Economics* **4**:2, 168-198. [[Abstract](#)] [[View PDF article](#)] [[PDF with links](#)]
482. Nikolaus Hautsch, Ruihong Huang. 2012. The market impact of a limit order. *Journal of Economic Dynamics and Control* **36**:4, 501-522. [[Crossref](#)]
483. Syed Abul Basher, Alfred A. Haug, Perry Sadorsky. 2012. Oil prices, exchange rates and emerging stock markets. *Energy Economics* **34**:1, 227-240. [[Crossref](#)]
484. Romain Bouis, Orsetta Causa, Lilas Demmou, Romain Duval. 2012. How quickly does structural reform pay off? An empirical analysis of the short-term effects of unemployment benefit reform. *IZA Journal of Labor Policy* **1**:1, 12. [[Crossref](#)]
485. Daniel Hollo, Manfred Kremer, Marco Lo Duca. 2012. CISS - A Composite Indicator of Systemic Stress in the Financial System. *SSRN Electronic Journal* . [[Crossref](#)]
486. Andrew P. Powell. 2012. The World of Forking Paths: Latin America and the Caribbean Facing Global Economic Risks. *SSRN Electronic Journal* . [[Crossref](#)]
487. Paulo F. Maio. 2012. The Long-Run Relation between Returns, Earnings, and Dividends. *SSRN Electronic Journal* . [[Crossref](#)]
488. Pablo M. Pincheira, Carlos A. Medel. 2012. Forecasting Inflation with a Random Walk. *SSRN Electronic Journal* . [[Crossref](#)]
489. Davide Furceri, Lorenzo E. Bernal-Verdugo, Dominique M. Guillaume. 2012. Crises, Labor Market Policy, and Unemployment. *IMF Working Papers* **12**:65, i. [[Crossref](#)]
490. Lutz Kilian, Robert J. Vigfusson. 2011. NONLINEARITIES IN THE OIL PRICE-OUTPUT RELATIONSHIP. *Macroeconomic Dynamics* **15**:S3, 337-363. [[Crossref](#)]
491. James D. Hamilton. 2011. NONLINEARITIES AND THE MACROECONOMIC EFFECTS OF OIL PRICES. *Macroeconomic Dynamics* **15**:S3, 364-378. [[Crossref](#)]
492. Lutz Kilian, Yun Jung Kim. 2011. How Reliable Are Local Projection Estimators of Impulse Responses?. *Review of Economics and Statistics* **93**:4, 1460-1466. [[Crossref](#)]

493. Òscar Jordà, Sharon Kozicki. 2011. ESTIMATION AND INFERENCE BY THE METHOD OF PROJECTION MINIMUM DISTANCE: AN APPLICATION TO THE NEW KEYNESIAN HYBRID PHILLIPS CURVE*. *International Economic Review* 52:2, 461-487. [[Crossref](#)]
494. Jyh-Lin Wu, Chingnun Lee, Tzu-Wei Wang. 2011. A re-examination on dissecting the purchasing power parity puzzle. *Journal of International Money and Finance* 30:3, 572-586. [[Crossref](#)]
495. Ryan R. Brady. 2011. Measuring the diffusion of housing prices across space and over time. *Journal of Applied Econometrics* 26:2, 213-231. [[Crossref](#)]
496. John C. Bluedorn, Christopher Bowdler. 2011. The open economy consequences of U.S. monetary policy. *Journal of International Money and Finance* 30:2, 309-336. [[Crossref](#)]
497. Ryan R Brady, Derek S Stimel. 2011. How the Housing and Financial Wealth Effects Have Changed over Time. *The B.E. Journal of Macroeconomics* 11:1. . [[Crossref](#)]
498. Show-Lin Chen, Jyh-Lin Wu. 2011. Home bias and the persistence of real exchange rates. *Economic Modelling* 28:1-2, 55-59. [[Crossref](#)]
499. RYAN R. BRADY. 2011. CONSUMER CREDIT, LIQUIDITY, AND THE TRANSMISSION MECHANISM OF MONETARY POLICY. *Economic Inquiry* 49:1, 246-263. [[Crossref](#)]
500. Lutz Kilian, Robert John Vigfusson. 2011. Nonlinearities in the Oil Price-Output Relationship. *SSRN Electronic Journal* . [[Crossref](#)]
501. Syed Basher, Alfred A. Haug, Perry Sadorsky. 2011. Oil Prices, Exchange Rates and Emerging Stock Markets. *SSRN Electronic Journal* . [[Crossref](#)]
502. Rudiger Ahrend, Jens Matthias Matthias Arnold, Charlotte Moeser. 2011. The Sharing of Macroeconomic Risk: Who Loses (and Gains) from Macroeconomic Shocks. *SSRN Electronic Journal* . [[Crossref](#)]
503. Davide Furceri, Aleksandra Zdzienicka. 2011. How Costly Are Debt Crises?. *IMF Working Papers* 11:280, i. [[Crossref](#)]
504. Patrick Fève, Alain Guay. 2010. Identification of Technology Shocks in Structural Vars. *The Economic Journal* 120:549, 1284-1318. [[Crossref](#)]
505. Lee Keun Yeong. 2010. The Effect of International Cooperation of Interest Rate Policy on Domestic Macroeconomic Variables. *KUKJE KYUNGJE YONGU* 16:3, 131-156. [[Crossref](#)]
506. Lukas Menkhoff, Maik Schmeling. 2010. Trader see, trader do: How do (small) FX traders react to large counterparties' trades?. *Journal of International Money and Finance* 29:7, 1283-1302. [[Crossref](#)]
507. Uluc Aysun. 2010. Testing for Balance Sheet Effects in Emerging Markets: A Non-Crisis Setting*. *International Finance* 13:2, 223-256. [[Crossref](#)]
508. Òscar Jordà, Massimiliano Marcellino. 2010. Path forecast evaluation. *Journal of Applied Econometrics* 25:4, 635-662. [[Crossref](#)]
509. G. M. Kuersteiner. Granger-Sims causality 119-134. [[Crossref](#)]
510. Neville Francis, Michael Owyang, Jennifer E. Roush, Riccardo DiCecio. 2010. A Flexible Finite-Horizon Alternative to Long-Run Restrictions with an Application to Technology Shocks. *SSRN Electronic Journal* . [[Crossref](#)]
511. Lukas Menkhoff, Maik Schmeling. 2010. Trader See, Trader Do: How Do (Small) FX Traders React to Large Counterparties' Trades?. *SSRN Electronic Journal* . [[Crossref](#)]
512. Davide Furceri, Aleksandra Zdzienicka. 2010. Banking Crises and Short and Medium Term Output Losses in Developing Countries: The Role of Structural and Policy Variables. *SSRN Electronic Journal* . [[Crossref](#)]
513. Davide Furceri, Aleksandra Zdzienicka. 2010. The Consequences of Banking Crises on Public Debt. *SSRN Electronic Journal* . [[Crossref](#)]

514. Aleksandra Zdzenicka, Davide Furceri. 2010. The Consequences of Banking Crises for Public Debt. *SSRN Electronic Journal* . [[Crossref](#)]
515. Aleksandra Zdzenicka, Davide Furceri. 2010. How Costly are Debt Crises?. *SSRN Electronic Journal* . [[Crossref](#)]
516. Nikolaus Hautsch, Ruihong Huang. 2010. The Market Impact of a Limit Order. *SSRN Electronic Journal* . [[Crossref](#)]
517. Davide Furceri, Aleksandra Zdzenicka. 2010. The Consequences of Banking Crises for Public Debt. *SSRN Electronic Journal* . [[Crossref](#)]
518. Òscar Jordà. 2009. Simultaneous Confidence Regions for Impulse Responses. *Review of Economics and Statistics* **91**:3, 629-647. [[Crossref](#)]
519. Ki-Ho Kim, Seong-Hun Yun. 2009. Asymmetric and Nonlinear Effects of Oil Price and Exchange Rate Shocks on Consumer Price. *KUKJE KYUNGJE YONGU* **15**:2, 131-152. [[Crossref](#)]
520. Utpal Bhattacharya, Neal Galpin, Rina Ray, Xiaoyun Yu. 2009. The Role of the Media in the Internet IPO Bubble. *Journal of Financial and Quantitative Analysis* **44**:3, 657-682. [[Crossref](#)]
521. Uluc Aysun. 2008. Automatic stabilizer feature of fixed exchange rate regimes. *Emerging Markets Review* **9**:4, 302-328. [[Crossref](#)]
522. Tsung-Wu Ho. 2008. On the dynamic relationship of exchange rates and monetary fundamentals: an impulse-response analysis by local projections. *Applied Economics Letters* **15**:14, 1141-1145. [[Crossref](#)]
523. G. M. Kuersteiner. Granger-Sims Causality 1-13. [[Crossref](#)]
524. Oscar Jordà, Massimiliano Giuseppe Marcellino. 2008. Path Forecast Evaluation. *SSRN Electronic Journal* . [[Crossref](#)]
525. Miroslav Misina, David Tessier. 2008. Non-Linearities, Model Uncertainty, and Macro Stress Testing. *SSRN Electronic Journal* . [[Crossref](#)]
526. Pao-Li Chang, Shinichi Sakata. 2007. Estimation of impulse response functions using long autoregression. *The Econometrics Journal* **10**:2, 453-469. [[Crossref](#)]
527. Oscar Jordà. 2007. Inference for Impulse Responses. *SSRN Electronic Journal* . [[Crossref](#)]
528. Oscar Jordà, Sharon Kozicki. 2007. Estimation and Inference by the Method of Projection Minimum Distance. *SSRN Electronic Journal* . [[Crossref](#)]
529. Patrizio Pagano, Alessio Anzuini, Massimiliano Pisani. 2007. Oil Supply News in a VAR: Information from Financial Markets. *SSRN Electronic Journal* . [[Crossref](#)]
530. Alfred A. Haug, Christie Smith. 2007. Local Linear Impulse Responses for a Small Open Economy. *SSRN Electronic Journal* . [[Crossref](#)]
531. Utpal Bhattacharya, Xiaoyun Yu, Neal E. Galpin, Rina Ray. 2007. The Role of the Media in the Internet IPO Bubble. *SSRN Electronic Journal* . [[Crossref](#)]
532. Oscar Jordà. 2007. Joint Inference and Counterfactual Experimentation for Impulse Response Functions By Local Projections. *SSRN Electronic Journal* . [[Crossref](#)]
533. Jian Yang, Hui Guo, Zijun Wang. 2006. International transmission of inflation among G-7 countries: A data-determined VAR analysis. *Journal of Banking & Finance* **30**:10, 2681-2700. [[Crossref](#)]
534. Oscar Jordà, Sharon Kozicki. 2006. Projection Minimum Distance: An Estimator for Dynamic Macroeconomic Models. *SSRN Electronic Journal* . [[Crossref](#)]
535. Laura Mayoral. 2005. The Persistence of Inflation in OECD Countries: A Fractionally Integrated Approach. *SSRN Electronic Journal* . [[Crossref](#)]
536. International Monetary Fund. World Economic Outlook, April 2015: Uneven Growth: Short- and Long-Term Factors . [[Crossref](#)]