Postscript to

"Macroeconomic Shocks and their Propagation"
in *Handbook of Macroeconomics*, 2016, by Valerie A. Ramey.

Latest update: January 20, 2022

This document serves as a running postscript to my *Handbook* chapter on macroeconomic shocks. It contains corrections, clarifications, revised thinking on several issues, as well as a summary of a few key new results that have emerged in the literature. This postscript is not meant to serve as a continuing update on all of the related research, but rather as an update only on the research that is closely related to particular statements I made or particular specifications I chose in the chapter. All page numbers refer to the published version.

Corrections

1. Equation (9), p. 81. The index on the second and third summations (involving ΔY_2 and ΔY_3) should start at j=0, not j=1.

2. Figure 2B. The impact effects on the federal funds rate should range between 0.74 and 0.77. The unit impact effect shown in the graph is an error. The "monetary shocks" programs I posted online have been corrected. (I am grateful to LSE alumna Irene Benito for alerting me to this error.)

3. Footnote h should reference Mertens and Ravn (2014, online appendix), not 2013. (The article is their 2014 JME paper, though the online appendix has a 2013 date.)

Further thoughts, clarifications, and some directly relevant new research

1. **Number of lags of control variables.** In my chapter, I typically used only two lags of control variables in the local projections since I was using external instruments and wanted to be parsimonious. I have subsequently discovered that two lags was probably too little in some cases. I think that more lags is probably better. For example, in subsequent work in Ramey-Zubairy, 2018 JPE, we used four quarterly lags. Moreover, Montiel-Olea and Plagborg Møller (Econometrica 2021) show that *lag-augmented local projections* have many advantages.

2. **Correcting standard errors for serial correlation.** Following Jordà (2005), I had used a Newey-West correction for the standard errors since the error terms in local projections are serially correlated by construction for horizons greater than 0. However, Newey-West corrections are not even required if one uses Montiel-Olea and Plagborg Møller's

(Econometrica 2021) *lag-augmented local projections*, which simply involves adding an extra lag of the control variables. Moreover, Herbst and Johanssen (2020, FEDS paper 2020-010) show that in finite samples the use of the Newey-West correction can bias the standard error estimates downward. Thus, these recent results suggest adding the extra lag and not using the Newey-West correction.

3. **Necessary control variables.** On page 84, the statement concerning the control variables needed in a Jordà local projection may not be strong enough. See the Stock and Watson 2018 paper referenced below for the conditions needed.

4. **Robustness of local projections.** On page 84, I repeated Jordà's (2005) claim that the local projection method was more robust to misspecification. That claim is not correct. See the Plagborg-Møller and Wolf (*Econometrica* 2021) paper, referenced below, for more details.

5. **Shocks vs. External Instruments.** My discussion of the Gertler-Karadi high frequency variables in Section 3.5.3 too often blurred the distinction between "shocks," "news," and "instruments." Several times I used the term "shock" when I should have used the term "instrument," contrary to the distinctions I made in Section 2 of my chapter. (I am grateful to Mark Kerßenfischer (Kerssenfischer) of the Bundesbank for bringing this to my attention.)

6. **Lead-Lag Exogeneity.** Stock and Watson, "Identification and Estimation of Dynamic Causal Effects in Macroeconomics using External Instruments," *Economic Journal*, May 2018, is a very useful rigorous investigation of external instruments in SVARs and in the local projections-IV methods I used in my Handbook chapter. It establishes the importance of "lead-lag exogeneity," the requirement that the instrument be uncorrelated with past and future shocks. My published discussion of Guren, McKay, Nakamura, and Steinsson's paper in the 2020 NBER Macro Annual shows that their estimated multipliers decline significantly when I include lags of the instruments and controls to ensure lead-lag exogeneity.

7. **Relationship between SVARS and Local Projections.** Mikkel Plagborg-Møller and Christian Wolf, "Local Projections and VARs Estimate the Same Impulse Response Functions," 2021 *Econometrica* formally clarifies the relationship between local projections and SVARs, including proxy SVARs (or external instruments). It shows, contrary to a number of statements in the literature, that *in population* local projections and VARS estimate the same impulse response functions. In sample, where one is forced to use finite lags, etc., they will generally differ. This paper works through numerous issues involved and is a very helpful clarification of the relationship between the two methods. It also validates a procedure I used in my 2011 QJE paper, where I ordered the external instrument first in an SVAR.

8. **Figure 1, CEE Monetary Shocks**. In this graph, I showed that re-estimating CEE's specification for the period 1983-2007 led to anomalous results, but if I excluded the money and reserve variables, the results looked like those from the earlier period. Edoardo Chiarotti (PhD Candidate, The Graduate Institute, Geneva) discovered that the source of the difference in the 1983-2007 results with and without the money and reserve variables was due to a mismatch between the non-borrowed reserves variable, which is adjusted for regulatory changes, and the total reserves variable, which is not adjusted for regulatory changes. He explains the issue and offers a fix in this note. His programs are available here.