Sept 22 2021 – JMCB Replication file

%Federico Ravenna and Carl Walsh

%"Worker heterogeneity, selection, and employment dynamics in a pandemic"

% Journal of Money, Credit and Banking

%First draft: April 2020

% Current draft: August 2021

%%%%

% SEE README JMCB RAVENNA WALSH 2021.DOC

%%%%

//Federico Ravenna and Carl Walsh

//"Worker heterogeneity, selection, and employment dynamics in a pandemic"

//Journal of Money, Credit and Banking

//First draft: April 2020

// Current draft: August 2021

// SEE README JMCB RAVENNA WALSH 2021.DOC

Directories for MATLAB and DYNARE code to produce tables and figures

# /JMCB\_rhox\_shock\_market\_param1a\_CPS\_Hybrid

Code runs on MATLAB R2015b and DYNARE v4.6.1

Call appropriate paths with

setpathdynare46.m

# Figure 2 to 6, Figure 3-Appendix

***From Readme\_rhox\_figures\_2021.m***

2. BUILD IRF comparison for paper

MARKET EQUILIBRIUM: match Y, RHOTOT with shock d,z,

GIVEN : steady state AND params from planner were previously saved in:

steadystate\_plan.mat

GIVEN: Shocks are saved in each .mod file

IMPLIED SHOCKS:(rhox and demand ) – Previously computed from matket equilibrium, then imputed in planner’s equilibrium

Planner:

-Set parameters in

>carl202parameters\_plan.m

-run dynare code

> dynare carl202zlb\_cond\_plan

- carl200plot\_e1\_cond2021.m plots some basic graphs and produces all variables

- save 'carl200\_irf'

- CLEAR ALL

Market:

.parameters are loaded from steadystate\_plan.mat

.set monetary policy parameters and thetap in

>carl202parameters

-run dynare code

> dynare carl202zlb\_cond\_market

-To save correctly steady state variables, run the code:

for iter = 1:M\_.param\_nbr %update parameters set in the file

eval([ M\_.param\_names{iter} ' = M\_.params(' int2str(iter) ');'])

end

- carl200plot\_e1\_cond2021.m plots some basic graphs and produces all variables

- save 'carl200\_irf\_eu'

- irf\_carl200\_dem\_2021final.m: produces plots, formatted for paper JMCB RESUBMISSION

NOTE: How to obtain plot showing unemployment shares, so that L,H workers are shown as share of the aggregate unemployment rate, rather than as shares of the respective labor force.

1. MATLAB produces panel 2 of the UNEMPLOYMENT RATE and UNEMPLOYMENT SHARES’ figures as the unemployment share for H, L workers. Each line is reported as the unemployment rate accounted for by H,L workers. The sum at each t of these two values gives back the aggregate unemployment rate, as share of the aggregate labor force.
2. From the MATLAB figure editor, change the plot type for each of the two lines (H and L unemployment shares) from LINE to AREA. MATLAB will then automatically ‘stack’ the two plots, so that the upper line shows the AGGREGATE unemployment rate, and each area represents the share of H,L workers
3. The LEGEND produced by the .m file already accounts for this. It is accurate only after stacking the plots.

# /JMCB\_rhox\_shock\_market\_param1a\_CPS\_Hybrid\_Appendix/Low\_ratio

Code runs on MATLAB R2015b and DYNARE v4.6.1

Call appropriate paths with

setpathdynare46.m

# Figure 1-Appendix,

2. BUILD IRF comparison for paper

MARKET EQUILIBRIUM: match Y, RHOTOT with shock d,z,

GIVEN : steady state AND params from planner were previously saved in:

steadystate\_plan.mat

GIVEN: Shocks are saved in each .mod file

IMPLIED SHOCKS:(rhox and demand ) – Previously computed from matket equilibrium, then imputed in planner’s equilibrium

Market:

.parameters are loaded from steadystate\_plan.mat

.set monetary policy parameters and thetap in

>carl202parameters

-run dynare code

> dynare carl202zlb\_cond\_market

-To save correctly steady state variables, run the code:

for iter = 1:M\_.param\_nbr %update parameters set in the file

eval([ M\_.param\_names{iter} ' = M\_.params(' int2str(iter) ');'])

end

- carl200plot\_e1\_cond2021.m plots some basic graphs and produces all variables

- save 'carl200\_irf\_eu'

- irf\_carl200\_dem\_2021final.m: produces plots, formatted for paper JMCB RESUBMISSION

NOTE: How to obtain plot showing unemployment shares, so that L,H workers are shown as share of the aggregate unemployment rate, rather than as shares of the respective labor force.

1. MATLAB produces panel 2 of the UNEMPLOYMENT RATE and UNEMPLOYMENT SHARES’ figures as the unemployment share for H, L workers. Each line is reported as the unemployment rate accounted for by H,L workers. The sum at each t of these two values gives back the aggregate unemployment rate, as share of the aggregate labor force.
2. From the MATLAB figure editor, change the plot type for each of the two lines (H and L unemployment shares) from LINE to AREA. MATLAB will then automatically ‘stack’ the two plots, so that the upper line shows the AGGREGATE unemployment rate, and each area represents the share of H,L workers
3. The LEGEND produced by the .m file already accounts for this. It is accurate only after stacking the plots.

# /JMCB\_rhox\_shock\_market\_param1a\_CPS\_Hybrid\_Appendix/High\_ratio

Code runs on MATLAB R2015b and DYNARE v4.6.1

Call appropriate paths with

setpathdynare46.m

# Figure 2-Appendix,

2. BUILD IRF comparison for paper

MARKET EQUILIBRIUM: match Y, RHOTOT with shock d,z,

GIVEN : steady state AND params from planner were previously saved in:

steadystate\_plan.mat

GIVEN: Shocks are saved in each .mod file

IMPLIED SHOCKS:(rhox and demand ) – Previously computed from matket equilibrium, then imputed in planner’s equilibrium

Market:

.parameters are loaded from steadystate\_plan.mat

.set monetary policy parameters and thetap in

>carl202parameters

-run dynare code

> dynare carl202zlb\_cond\_market

-To save correctly steady state variables, run the code:

for iter = 1:M\_.param\_nbr %update parameters set in the file

eval([ M\_.param\_names{iter} ' = M\_.params(' int2str(iter) ');'])

end

- carl200plot\_e1\_cond2021.m plots some basic graphs and produces all variables

- save 'carl200\_irf\_eu'

- irf\_carl200\_dem\_2021final.m: produces plots, formatted for paper JMCB RESUBMISSION

NOTE: How to obtain plot showing unemployment shares, so that L,H workers are shown as share of the aggregate unemployment rate, rather than as shares of the respective labor force.

1. MATLAB produces panel 2 of the UNEMPLOYMENT RATE and UNEMPLOYMENT SHARES’ figures as the unemployment share for H, L workers. Each line is reported as the unemployment rate accounted for by H,L workers. The sum at each t of these two values gives back the aggregate unemployment rate, as share of the aggregate labor force.
2. From the MATLAB figure editor, change the plot type for each of the two lines (H and L unemployment shares) from LINE to AREA. MATLAB will then automatically ‘stack’ the two plots, so that the upper line shows the AGGREGATE unemployment rate, and each area represents the share of H,L workers
3. The LEGEND produced by the .m file already accounts for this. It is accurate only after stacking the plots.

# /JMCB\_rhox\_shock\_temp

Code runs on MATLAB R2015b and DYNARE v4.6.1

Call appropriate paths with

setpathdynare46.m

# Figure 8

***From Readme\_templayoff\_2021.m***

$To produce paper figures

- Set in carl202parameters.m

inff = 0

to obtain equilibrium without temporary layoffs

- Run dynare code

dynare carl202zlb\_cond2loadss

- carl200plot\_e1\_cond2020.m plots some basic graphs and produces all variables

- save 'carl200\_irf\_eu'

- CLEAR ALL

- Set in carl202parameters.m

inff = 0.14596

to obtain equilibrium WITH temporary layoffs

- Run dynare code

dynare carl202zlb\_cond2loadss

- carl200plot\_e1\_cond2020.m plots some basic graphs and produces all variables

- save 'carl200\_irf' (SOLID - TEMP LAYOFFS)

- irf\_carl200\_dem\_2021final.m: produces plots, formatted for paper JMCB RESUBMISSION

NOTE: Figure 8 shows DIFFERENCE between model with temporary layoffs and without temporary layoffs

NOTE: How to obtain plot showing unemployment shares, so that L,H workers are shown as share of the aggregate unemployment rate, rather than as shares of the respective labor force.

1. MATLAB produces panel 2 of the figure as the unemployment share for H, L workers. Each line is reported as the unemployment rate accounted for by H,L workers. The sum at each t of these two values gives back the aggregate unemployment rate, as share of the aggregate labor force.
2. From the MATLAB figure editor, change the plot type for each of the two lines (H and L unemployment shares) from LINE to AREA. MATLAB will then automatically ‘stack’ the two plots, so that the upper line shows the AGGREGATE unemployment rate, and each area represents the share of H,L workers
3. The LEGEND produced by the .m file already accounts for this. It is accurate only after stacking the plots.

# /JMCB\_rhox\_shock\_temp\_policy

Code runs on MATLAB R2015b and DYNARE v4.6.1

Call appropriate paths with

setpathdynare46.m

# Figure 9-10, Table 2, Figures in Appendix 4 to 8

***From Readme\_templayoff\_POLICY\_2021.m***

POLICY CHOICE

>> Policy parameters are chosen at start of file carl202paramters\_m

chi = 0;

omegap = 1.5

omegay = 0

>> Policy rule is chosen in section //POLICY RULE, at line 219, of code

dynare carl202zlb\_cond2loadss.mod

$To produce FORMATTED POLICY COMPARISON paper figures, 3 POLICIES at same time, choosing which policy to implement [SEE LATER TO PRODUCE FIGURES /TABLES USING JMCB DEFINED POLICIES]

- Run dynare code WITH POLICY 'BENCH' (benchmark -solid line)

- carl200plot\_e1\_cond2020.m plots some basic graphs and produces all variables

- save 'policy\_bbench'

- CLEAR ALL

- Run alternative Dynare code WITH POLICY 'A' (dashed line)

- produce alternative variables either with carl200plot\_e1\_cond2020.m (conditional forecast)

- save 'policy\_aa'

- CLEAR ALL

- Run alternative Dynare code WITH POLICY 'B' (dotted line)

- produce alternative variables either with carl200plot\_e1\_cond2020.m (conditional forecast)

- save 'policy\_bb'

- irf\_carl200\_dem\_2021policyfinal.m produces plots

. it also runs additional plots asking to load policy\_bench, policy\_a, policy\_b

$irf\_carl200\_dem\_2021policyfinal

To produce paper figures, load paper saved policies:

policy\_bbench

policy\_aa

policy\_bb

policy\_a0

policy\_b0

% BENCHMARK: std IT, policy\_bbench // SOLID

solid = ['Policy: Benchmark inflation target']

% POLICY A: Expansionary omegay\*N,omegay=0.39 policy\_aa //DASHED

dashed = ['Policy: Unemployment target']

% POLICY B: Expansionary omegay\*Nl,omegay=0.5 policy\_bb //DOTTED

dotted = ['Policy: L-workers Unemployment target']

% POLICY AA (BENCHMARK): Expansionary omegay\*N,omegay=0.39 policy\_aa // SOLID

solid = ['Policy: Unemployment target']

% POLICY A0: STRICT IT, policy\_a0 //DASHED

dashed = ['Policy: Price stability']

% POLICY B0: Expansionary omegay\*rhon,omegay=-0.01 policy\_b0 //DOTTED

dotted = ['Policy: L-workers Layoff rate target']

**%%%%%%%%%%%% jmcb figures**

To produce figures for policy experiments in appendix, in paper, and to produce data for TABLE 2:

irf\_carl200\_dem\_2021policyfinal\_aug.m

load paper saved policies, produced as described above:

policy\_bbench

policy\_aa

policy\_bb

policy\_a0

policy\_b0

% BENCHMARK: std IT, policy\_bbench // DOTTED

dotted = ['Policy (2): Respond to inflation (benchmark)']

% POLICY A: Expansionary omegay\*N,omegay=0.4 policy\_aa //DASHED

dashed = ['Policy (3): Respond to unemployment \omega\_{u}=0.4']

% POLICY B: Expansionary omegay\*N,omegay=0.8 policy\_bb //dashedDOTTED

dasheddotted = ['Policy (4): Respond to unemployment \omega\_{u}=0.8']

% POLICY A0: STRICT IT, policy\_a0 //SOLID

solid = ['Policy (1): Price stability']

% POLICY RHON: react to layoff rate // diamond

diamonds = ['Policy (5): Respond to separation rate']

% POLICY NTARGET: stabilize unemployment at ss 'policy\_ntarget'// squares

squares = ['Policy targeting zero-unemployment']

%%%%%%%%%%%%% TABLE 2

Numbers for table are produced by

irf\_carl200\_dem\_2021policyfinal\_aug.m

during output of figures

ADDITIONAL FILES WITH DATA and PARAMETERS

# Corrected\_ss.xls

Contains

* Computation of parameterization for H,L workers unemployment, based on "Pandemic Recession: L- or V-Shaped?", Victoria Gregory  Guido Menzio and  David Wiczer, Federal Reserve Bank of Minneapolis Quarterly Review, May 2020, Vol. 40, No. 4011, 1
* Steady state values and list of variables

# MatlabShocks.xls

Contains

1.Data for SPF forecast for unemployment (not used), and GDP, to build forecasted trajectories of same variables in model, and filter out shocks consistent with these paths for observables

2.BLS data for temporary separation share

3.CPS data for computing initial increase in separations as pandemics hits Q2/2020

4. Mapping of SPF and BLS data to build Y, RHOTOT (separations) targets, and TEMP LAYOFFS parameterizations (target variables)

NOTE FOR AUTHORS –

Organization of directories

C:\Users\luisa\Dropbox (DN Research)\- HEC\-- HEC - D\dynare\_v3.064\labor\_bdf\_zlb\bdf new dynare 15 march 2014 efficient\zlb\_2014\2021 JMCB replication

Directory

/2021 JMCB replication

Contains directories with name mirroring original directories where file used to sit. For example, files in

/2021\_rhox\_shock\_market\_param1a\_CPS\_Hybrid

Have their cleaned-up version stored in

/JMCB\_rhox\_shock\_market\_param1a\_CPS\_Hybrid

Similarly, files maintain the same name and sub-call order