The following is a road map to the MatLab code bases constructed by Carlaw to generate the data used to create the tables and figures for the paper: Bekar, Carlaw and Eaton "A Dynamic Theory of Deterrence and Compliance" Mar. 07, 2023.

1 Benchmarking The Convergence Simulator

Table A.1 uses two MatLab files: $ASBbenchTMSDV2.m$ generates the stationary distribution set for all values of $R \in \{0, ..., 50\}$. These data are stored to $SD.mat$ and used in MatLab file $ASBbenchconvSDV2.m$ to generate the various measures of ATEST (i.e., mean, standard deviation, max, and mean number of blocks of 50K iterations to achieve convergence of the estimated SD).

2 Section 3 figures

Figures 3.1-7 are created using several files. Mostly these are based on a version of the the convergence simulator.

Figure 3.1 is generated using $ASBconV2Fig31to9.m$. This is the main convergence simulator for passive policies.

Figure 3.2 can be generated using $ASBconV2Fig31to9.m$. However, the production of this figure requires significant playing around to identifying the proper time series in which a transition from BB to GB and vice versa occurs. A separate MatLab file with a fixed data run stored in a separate excel file is used to generate a given version of fig 3.2. $ASBconvV2Fig32.m$ generates this version of fig 3.2 using $fig32vect.xlsx$.

Figure 3.3 is generated using $ASBconV2Fig31to9.m$.

Figure 3.4 is generated using $ASBattractorsFig34v2.m$. It requires output from $ASBEquilibMDL.m$, stored in the form of data (.txt) files [$PrEq2$, $TPrEq2$, $GPrEq2$, $BPrEq2$ and $vEq2$].

Figure 3.5 is generated using $ASBattractorsFig35v2.m$. It requires output from $ASBequilibMDL.m$, stored in the form of data (.txt) files [$PrEq2$, $TPrEq2$, $GPrEq2$, $BPrEq2$ and $vEq2$].

Figure 3.6 is generated using $ASBconV2Fig31to9.m$.

Figure 3.7 is generated from $ASBconV2Fig37.m$. (This file takes a long time to run.)

3 Section 4 Figures

Figure 4.1 is generated using two codebases. Codebase $ASBconV2Fig31to9.m$ is used to generate data for figure one from the convergence sim for the three values of $DROP$ plotted in the figure. That data is stored to the (.txt) files [$mvbl$, $mvbld$, and $mvblD1$] and called into codebase $ASBconV2Fig41Fig43.m$. The figure is generated with $ASBconV2Fig41Fig43.m$.

Figure 4.2 is generated from $ASBconDROPFig42.m$ using data stored in $fg8DROPn.txt$ which is generated from the convergence sim $ASBconDROP30.m$.

Figure 4.3 is generated from four different versions of the convergence sim: $ASBconV2Fig31to9.m$, generates $mvbl.txt$, $ASBconV2expApr.m$ generates $mvApr.txt$, $ASBconV2hetq.m$ generates $mvhetq.txt$, and $ASCconV2unifg.m$ generates $mvunifg.txt$. these four data files are used in codebase $ASBconV2Fig41Fig43.m$ to produce the figure.

4 Section 5 Figures

Figure 5.1 is generated from codebase $ABSconV2Fig51Fig72.m$ using data files $Rcon103$ and $Gbar103$. These data files are saved from the main convergence sim for passive policies $ASBconV2Fig31to9.m$. Codebase $ABSconV2Fig51Fig72.m$ creates several versions of the cost functions for many of values of RAT which are created by holding $\rho = 2$ and varying λ.

Figure 5.2 is generated from codebase $ASBconV2Fig31to9.m$.

5 Section 6 Figures

The date for Figure 6.1 is generated from codebase $ASBcon2RFig61.m$. The production of this figure requires significant playing around to identifying the proper time series in which a transition from BB to GB and vice versa occurs. A separate MatLab file $ASBcon2RquickFig61.m$ using a fixed data set of time series stored as ($.txt$) files [$fig61v$, $fig61bin$, $fig61ARATE$, $fig61R$, $fig61A$, and $fig61q$] is used to generate a given version of the figure.

Figure 6.2 is generated from codebase $ASBattractorsblFig62.m$. It requires output from $ASBequilibMDL.m$, stored in the form of data (.txt) files [$PrEq2$, $TPrEq2$, $GPrEq2$, $BPrEq2$ and $vEq2$].

Figure 6.3 and Figure 6.4 are generated from codebase $ASBopt2RFig63Fig64.m$ using data (in files $costRgb.mat$, $costRbb.mat$, $costb.mat$, $Ev.mat$ and $Ea.mat$) generated from codebases $ASBcon2RV6opt.m$, $ASBcon2RV7opt.m$ and $ASBcon2RV8opt.m$.

6 Section 7 Figures

Figure 7.1 is generated from codebase $ASBpasactDROPFig71.m$ using data from the excel sheet $DRPpolcost.xlsx$. The data in the excel sheet are generated using the convergence sim codebases: $ASBconV2Fig31to9.m$ for passive policies, $ASBcon2R2100simV2.m$ for crackdown policies and $ASBcon3R100simV2.m$ for refined crackdown polices. The crack down and refined crackdown codebases are modifications of the search routines for finding the optimal crackdown and refined crackdown policies discussed in Section 6 and Appendices A.4 and A.5 of the paper.

Figure 7.2 is generated from codebase $ABSconV2Fig51Fig72.m$ using data in excel file $lamrho.xlsx$. The excel file data was created using codebases $ASBconV2Fig31to9.m$, $ASBcon2RoptRCNZ.m$ and $ASBcon2RoptRCLR.m$. These are all variations of the convergence sim for passive and active (crackdown) policy.

7 Appendix Figures

Figure A.1 is generated from codebase $ASBEquilibMDL.m$.

Figure A.2 generated from codebase $ASBconR3FigA2.m$.

8 Tables 6.1, 6.2 and A.2

Tables 6.1, 6.2 and A.2 are created using data generated from two MatLab code bases each. The process to generate the data for these tables is computationally intensive.

For Table 6.1, first 1000 randomly seeded search simulations are run using $ASBcon2R21000sim.m$. This codes base takes a very long time to run (approximately 10 days). Then 150 Monte Carlo simulations are run for the crackdown policies (CD) in the neighborhood of the optimum using code base $ASBcon2RCDMC150.m$

For Table A.2, first 1000 randomly seeded search simulations are run using $ASBcon3R1000sim.m$. This codes base takes a very long time to run (approximately 10 days or more). Then 150 Monte Carlo simulations are run for each of the 25 lowest costs refined crackdown policies (RCD) using code base $ASBcon3R25RCDMC150.m$

Table 6.2 is derived from the lowest three 25 lowest RCD policies determined in the process of creating Table A.2.