

# DynareR: Bringing the Power of Dynare to R, R Markdown, and Quarto

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## About the Author

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## 1 About DynareR

DynareR is an R package that can run Dynare program from R Markdown.

## 2 Requirements

Users need the following in order to knit this document:

1. Dynare 4.6.1 or above
2. Octave 5.2.0 or above
3. Dynare is installed in the standard location as follows:
  - `/usr/lib/dynare/matlab` for Linux
  - `/usr/lib/dynare/matlab` for macOS
  - `c:/dynare/x.y/matlab` for Windows, where `x.y` is Dynare version number.

If `dynare` and `Octave` are installed in standard location, `DynareR` package will take care of the configurations, which include adding `matlab` directory to path, using the latest installed `dynare` and so on. Otherwise, users have to specify the `matlab` folder using `add_path` function, set the `Octave` path using the `set_octave_path` function, or set `dynare` version using the `set_dynare_version` function.

### 3 Installation

DynareR can be installed using the following commands in R.

```
install.packages("DynareR")

OR

devtools::install_github('sagirumati/DynareR')
```

### 4 Usage

Please load the DynareR package as follows:

```
::: {.cell}

```{.cell-code}
```{r DynareR}
library(DynareR)
```
~~~~
:::
```

Then create a chunk for `dynare` (adopted from Dynare example file `bkk`) as shown below:

```
::: {.cell}

:::
```

The above chunk creates a Dynare program with the chunk's content, then automatically run Dynare, which will save Dynare outputs in the current directory.

Please note that DynareR uses the chunk name as the model name. So, the output of Dynare are saved in a folder with its respective chunk name. Thus a new folder `bkk/` will be created in your current working directory.

By default, `dynare` chunk imports log output as a list of dataframes, which can be accessed via `dynare$modelName`. Therefore to access the outputs of the `bkk` model produced by the `dynare` chunk, use `dynare$bkk`.

Use inline code `0.0024` to access the value of second row and third column of the `moments`, which is 0.0024.

## 5 Plotting the IRF

The Impulse Response Function (IRF) is saved by default in `bkk/bkk/graphs/` folder with the IRF's name `bkk_IRF_E_H2.pdf`, where `bkk` is the Dynare model's name. Therefore, you need to add `stoch_simul(graph_format = (pdf))` to change the default saving behaviour of Dynare from `eps` to `pdf`.

## 6 DynareR functions for base R

The DynareR package is also designed to work with base R. The following functions show how to work with DynareR outside the R Markdown or Quarto documents.

### 6.1 The `include_IRF` function

Use this function to embed the graphs Impulse Response Function (IRF) in R Markdown or Quarto document.

The Impulse Response Function (IRF) of the `bkk` model can be fetched using the following R chunk. Note that only the last part of the IRF's name (`E_H2`) is needed, that is `bkk_IRF_` is excluded.

```
 ::: {.cell}

````{.cell-code}
````{r IRF,fig.cap="Another of figure generated from Dynare software"}
include_IRF("bkk","E_H2")

# Alternatively, use the path argument
````
```

```

~~~~

::: {.cell-output-display}
! [Another of figure generated from Dynare software] (bkk){fig-pos='H'}
:::
:::

include_IRF(model="bkk",IRF = "E_H2")

# Alternatively, use the path argument

include_IRF(path="bkk/bkk/graphs/bkk_IRF_E_H2.pdf")

```

However, Dynare figure can only be dynamically included if the output format is pdf as Dynare produces pdf and eps graphs only.

## 6.2 The write\_dyn function

This function writes a new dyn file.

Use `write_dyn(code="code",model="someModel")` if you want the Dynare file to live in the current working directory. if you want the Dynare file to live in the path different from the current working directory:

```
write_dyn(code="code",model="path/to/someDirectory/someModel")
```

```

dynareCodes='var y, c, k, a, h, b;
varexo e, u;
parameters beta, rho, alpha, delta, theta, psi, tau;
alpha = 0.36;
rho    = 0.95;
tau    = 0.025;
beta   = 0.99;
delta  = 0.025;
psi    = 0;
theta  = 2.95;
phi    = 0.1;
model;
c*theta*h^(1+psi)=(1-alpha)*y;
k = beta*(((exp(b)*c)/(exp(b(+1))*c(+1)))
          *(exp(b(+1))*alpha*y(+1)+(1-delta)*k));
y = exp(a)*(k(-1)^alpha)*(h^(1-alpha));

```

```

k = exp(b)*(y-c)+(1-delta)*k(-1);
a = rho*a(-1)+tau*b(-1) + e;
b = tau*a(-1)+rho*b(-1) + u;
end;
initval;
y = 1.08068253095672;
c = 0.80359242014163;
h = 0.29175631001732;
k = 11.08360443260358;
a = 0;
b = 0;
e = 0;
u = 0;
end;

shocks;
var e; stderr 0.009;
var u; stderr 0.009;
var e, u = phi*0.009*0.009;
end;

stoch_simul;'

write_dyn(code=dynareCodes, model="example1")

write_dyn(code=dynareCodes,model="DynareR/write_dyn/example1")

```

## 6.3 The write\_mod function

This function writes a new mod file.

Use `write_mod(code="code",model="someModel")` if you want the Dynare file to live in the current working directory. if you want the Dynare file to live in the path different from the current working directory:

```
write_mod(code="code",model="path/to/someDirectory/someModel")
```

```

DynareCodes='var y, c, k, a, h, b;
varexo e, u;
parameters beta, rho, alpha, delta, theta, psi, tau;

```

```

alpha = 0.36;
rho    = 0.95;
tau    = 0.025;
beta   = 0.99;
delta  = 0.025;
psi    = 0;
theta  = 2.95;
phi    = 0.1;
model;
c*theta*h^(1+psi)=(1-alpha)*y;
k = beta*(((exp(b)*c)/(exp(b(+1))*c(+1)))
           *(exp(b(+1))*alpha*y(+1)+(1-delta)*k));
y = exp(a)*(k(-1)^alpha)*(h^(1-alpha));
k = exp(b)*(y-c)+(1-delta)*k(-1);
a = rho*a(-1)+tau*b(-1) + e;
b = tau*a(-1)+rho*b(-1) + u;
end;
initval;
y = 1.08068253095672;
c = 0.80359242014163;
h = 0.29175631001732;
k = 11.08360443260358;
a = 0;
b = 0;
e = 0;
u = 0;
end;

shocks;
var e; stderr 0.009;
var u; stderr 0.009;
var e, u = phi*0.009*0.009;
end;

stoch_simul;'

write_mod(model="example1",code=dynareCodes)

write_mod(code=dynareCodes,model="DynareR/write_mod/example1")

```

## 6.4 The run\_dynare function

Create and run Dynare mod file

Use this function to create and run Dynare mod file. Use `run_dynare(code="code",model="someModel")` if you want the Dynare files to live in the current working directory. if you want the Dynare files to live in the path different from the current working directory:

`run_dynare(code="code",model="path/to/someDirectory/someModel")`

Use `import_log=T` argument to return the dynare log file as list of dataframes in an environment `dynare`, which can be accessed via `dynare$modelName`.

```
DynareCodes='var y, c, k, a, h, b;
varexo e, u;
parameters beta, rho, alpha, delta, theta, psi, tau;
alpha = 0.36;
rho    = 0.95;
tau    = 0.025;
beta   = 0.99;
delta  = 0.025;
psi    = 0;
theta  = 2.95;
phi    = 0.1;
model;
c*theta*h^(1+psi)=(1-alpha)*y;
k = beta*(((exp(b)*c)/(exp(b(+1))*c(+1)))
          *(exp(b(+1))*alpha*y(+1)+(1-delta)*k));
y = exp(a)*(k(-1)^alpha)*(h^(1-alpha));
k = exp(b)*(y-c)+(1-delta)*k(-1);
a = rho*a(-1)+tau*b(-1) + e;
b = tau*a(-1)+rho*b(-1) + u;
end;
initval;
y = 1.08068253095672;
c = 0.80359242014163;
h = 0.29175631001732;
k = 11.08360443260358;
a = 0;
b = 0;
e = 0;
u = 0;
end;
```

```

shocks;
var e; stderr 0.009;
var u; stderr 0.009;
var e, u = phi*0.009*0.009;
end;

stoch_simul;'

run_dynare(code=DynareCodes,model="example1",import_log = T)
run_dynare(code=DynareCodes,model="DynareR/run_dynare/example1")

```

## 6.5 The run\_models function

Run multiple existing mod or dyn files.

Use this function to execute multiple existing Dynare files. Use `run_models(model="someModel")` if the Dynare files live in the current working directory. If the Dynare files live in the path different from the current working directory:

```
run_models(model="path/to/someDirectory/someModel")
```

Use `run_models()` to execute all the dynare models in the current working directory. Use `run_models("path/to/someDirectory*")` to run all the dynare models in `path/to/someDirectory`.

Where `agtrend.mod`, `bkk.mod` and `example1.mod` are the Dynare model files (with `mod` or `dyn` extension), which live in the current working directory.

```

demo(agtrend)
demo(bkk)
demo(example1)

# Provide the list of the `Dynare` files in a vector
# Ensure that "agtrend.mod", "bkk.mod" and "example1.mod"
# live in the current working directory

# Copy the dynare files to the current working directory

lapply(c("agtrend","bkk","example1"),\ (x) file.copy(paste0(x,"/",x,".mod"),"."))

run_models(c("agtrend","bkk","example1")) # Run the models in the vector.

```

To run all Dynare models that live in the current working directory, use the following:



```
run_models() # Run all models in Current Working Directory.
```

To run all Dynare models that live in particular path (for example 'DynareR/run\_dynare/' folder), use the following:

```
# Copy the dynare files to the 'DynareR/run_dynare' directory

lapply(c("agtrend", "bkk", "example1"), \(x) file.copy(paste0(x, ".mod"), "DynareR/run_dynare"))

run_models(model = 'DynareR/run_dynare*') # notice the * at the end
```

## 7 import\_log function

This function returns the dynare log output as a list of dataframes, which include `summary`, `shocks`, `policy`, `moments`, `decomposition`, `correlation` and `autocorrelation`. The list is accessible via `dynare$modelName`. if the model name is `bkk`, the policy variables can be obtained via `dynare$bkk$policy` as a dataframe.

```
import_log(model="bkk")

import_log(path="bkk/bkk.log")

knitr::kable(dynare$bkk$autocorrelation)
```

## 8 set\_dynare\_version function

On Windows, you can set the version of dynare you want to use. By default, DynareR package does this for you if the dynare version ranges from 4.6.1 to 9.9. However, if you are using the development version of dynare, for example version `6-unstable-2022-04-03-0800-700a0e3a`, you can override the default as follows

```
set_dynare_version("6-unstable-2022-04-03-0800-700a0e3a")
```

## 9 set\_octave\_path function

You can use this function if Octave is not installed in the standard location.

```
set_octave_path('C:/Program Files/GNU Octave/Octave-6.4.0/mingw64/bin/octave20.exe')
```

## 10 add\_path function

This function is a wrapper of `addpath` in Octave. If `dynare` is not installed in the standard location, use this function to add the `matlab` subdirectory. By default, DynareR does this for if `dynare` is installed in the standard location.

```
add_path('/usr/lib/dynare/matlab')# Default for Linux

add_path('c:/dynare/5.1/matlab') # Default for Windows, but 5.1 can change if later version
# `Dynare` is installed.

add_path('/usr/lib/dynare/matlab') # Default for macOS
```

## 11 Demo

The demo files are included and can be accessed via `demo(package="DynareR")`

```
demo(run_dynare)
demo(run_models)
demo(import_log)
```

## 12 Template

Template for R Markdown is created. Go to `file->New File->R Markdown-> From Template->DynareR`.

Please download the example files from [Github](#).