Cocco, Gomes, & Maenhout (2005)

"Consumption and Portfolio Choice Over the Life Cycle"

- Notebook created by Mateo Velásquez-Giraldo and Matthew Zahn.

In [1]:
```
# This cell does some preliminary set up

# Packages
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd

# Import relevenat HARK tools
import HARK.ConsumptionSaving.ConsPortfolioModel as cpm

# This is a jupytext paired notebook that autogenerates BufferStockTheory.py
# which can be executed from a terminal command line via "ipython BufferStockTheory
# But a terminal does not permit inline figures, so we need to test jupyter vs term
# Google "how can I check if code is executed in the ipython notebook"
from IPython import get_ipython # In case it was run from python instead of ipython

# If the ipython process contains 'terminal' assume not in a notebook
def in_ipynb():
    try:
        if 'terminal' in str(type(get_ipython())):
            return False
        else:
            return True
    except NameError:
        return False

# Determine whether to make the figures inline (for spyder or jupyter)
# vs whatever is the automatic setting that will apply if run from the terminal
if in_ipynb():
    # %matplotlib inline generates a syntax error when run from the shell
    # so do this instead
    get_ipython().run_line_magic('matplotlib', 'inline')
else:
    get_ipython().run_line_magic('matplotlib', 'auto')
```

In [2]:
```
# Calibrate the model in line with the information above
import sys,os
# The following code navigates to another directory where a python script with the
sys.path.append(os.path.realpath('Calibration/'))
# Loading the parameters from the Calibration/params.py script
from params import dict_portfolio, time_params, det_income, age_plot_params
```

In [3]:

```
# Solve the model with the given parameters
agent = cpm.PortfolioConsumerType(**dict_portfolio)
agent.solve()
```

```
---------------------------------------------------------------------------
Exception                                 Traceback (most recent call last)
Cell In[3], line 2
      1 # Solve the model with the given parameters
----> 2 agent = cpm.PortfolioConsumerType(**dict_portfolio)
      3 agent.solve()

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsPortfoli
oModel.py:172, in PortfolioConsumerType.__init__(self, verbose, quiet, **kwds)
    169 self.PortfolioBool = True
    171 # Initialize a basic consumer type
--> 172 RiskyAssetConsumerType.__init__(self, verbose=verbose, quiet=quiet, **kwds)
    174 # Set the solver for the portfolio model, and update various constructed att
ributes
    175 if self.IndepDstnBool:

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsRiskyAss
etModel.py:70, in IndShockRiskyAssetConsumerType.__init__(self, verbose, quiet, **kw
ds)
     67     self.sim_common_Rrisky = True
     69 # Initialize a basic consumer type
---> 70 IndShockConsumerType.__init__(self, verbose=verbose, quiet=quiet, **kwds)
     72 # These method must be overwritten by classes that inherit from
     73 # RiskyAssetConsumerType
     74 if self.PortfolioBool:

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsIndShock
Model.py:2295, in IndShockConsumerType.__init__(self, verbose, quiet, **kwds)
   2293 solver = ConsIndShockSolver
   2294 self.solve_one_period = make_one_period_oo_solver(solver)
-> 2295 self.update()

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsPortfoli
oModel.py:191, in PortfolioConsumerType.update(self)
    190 def update(self):
--> 191     RiskyAssetConsumerType.update(self)
    192     self.update_ShareGrid()
    193     self.update_ShareLimit()

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsRiskyAss
etModel.py:88, in IndShockRiskyAssetConsumerType.update(self)
     87 def update(self):
---> 88     IndShockConsumerType.update(self)
     89     self.update_AdjustDstn()
     90     self.update_RiskyDstn()

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsIndShock
Model.py:2348, in IndShockConsumerType.update(self)
   2336 def update(self):
   2337     """
   2338     Update the income process, the assets grid, and the terminal solution.
   2339 
   (...)
   2346     None
   2347     """
-> 2348     self.update_income_process()
```

```
   2349     self.update_assets_grid()
   2350     self.update_solution_terminal()

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsIndShockModel.py:2313, in IndShockConsumerType.update_income_process(self)
   2297 def update_income_process(self):
   2298     """
   2299     Updates this agent's income process based on his own attributes.
   2300 
   (...)
   2307     none
   2308     """
   2309     (
   2310         IncShkDstn,
   2311         PermShkDstn,
   2312         TranShkDstn,
-> 2313     ) = self.construct_lognormal_income_process_unemployment()
   2314     self.IncShkDstn = IncShkDstn
   2315     self.PermShkDstn = PermShkDstn

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\ConsumptionSaving\ConsIndShockModel.py:3733, in IndShockConsumerType.construct_lognormal_income_process_unemployment(self)
   3729     self.neutral_measure = False
   3731 neutral_measure_list = [self.neutral_measure] * len(PermShkCount_list)
-> 3733 IncShkDstn = IndexDistribution(
   3734     engine=BufferStockIncShkDstn,
   3735     conditional={
   3736         "sigma_Perm": PermShkStd,
   3737         "sigma_Tran": TranShkStd,
   3738         "n_approx_Perm": PermShkCount_list,
   3739         "n_approx_Tran": TranShkCount_list,
   3740         "neutral_measure": neutral_measure_list,
   3741         "UnempPrb": UnempPrb_list,
   3742         "IncUnemp": IncUnemp_list,
   3743     },
   3744     RNG=self.RNG,
   3745     seed=self.RNG.integers(0, 2**31 - 1),
   3746 )
   3748 PermShkDstn = IndexDistribution(
   3749     engine=LognormPermIncShk,
   3750     conditional={
   (...)
   3756     seed=self.RNG.integers(0, 2**31 - 1),
   3757 )
   3759 TranShkDstn = IndexDistribution(
   3760     engine=MixtureTranIncShk,
   3761     conditional={
   (...)
   3768     seed=self.RNG.integers(0, 2**31 - 1),
   3769 )

File ~\AppData\Local\anaconda3\Lib\site-packages\HARK\distribution.py:1315, in IndexDistribution.__init__(self, engine, conditional, RNG, seed)
   1310     self.dstns = [
   1311         self.engine(seed=self._rng.integers(0, 2**31 - 1), **conditional)
   1312     ]
   1314 else:
-> 1315     raise (
   1316         Exception(
   1317             f"IndexDistribution: Unhandled case for __getitem__ access. item
0: {item0}; conditional: {self.conditional}"
   1318         )
   1319     )

Exception: IndexDistribution: Unhandled case for __getitem__ access. item0: [0.10295
63 0.1029563 0.1029563 0.1029563 0.1029563 0.1029563 0.1029563
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'neutral_measure': [False, False, False, False, False, False, False, False, False, F
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rb': [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0], 'IncU
nemp': [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
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```