The current life stage of the policyholder affects the type of advice he will seek from other agents and the types of investment and insurance products he will purchase, such as mutual funds, retirement accounts, college savings plans, life insurance, annuities and long-term care.

Where the policyholder is in his life cycle will also affect his behavior on managing his standard of living, wealth and health. Specifically, it will affect behaviors with regard to:
1. Income sources
2. Spending habits
3. Savings rate
4. Asset allocations
5. Risk profile.

For example, a 30-year-old female who is married, has two children and is working full time will behave very differently than a 75-year-old female who is retired, has a few health issues and is living on Social Security and a small pension.
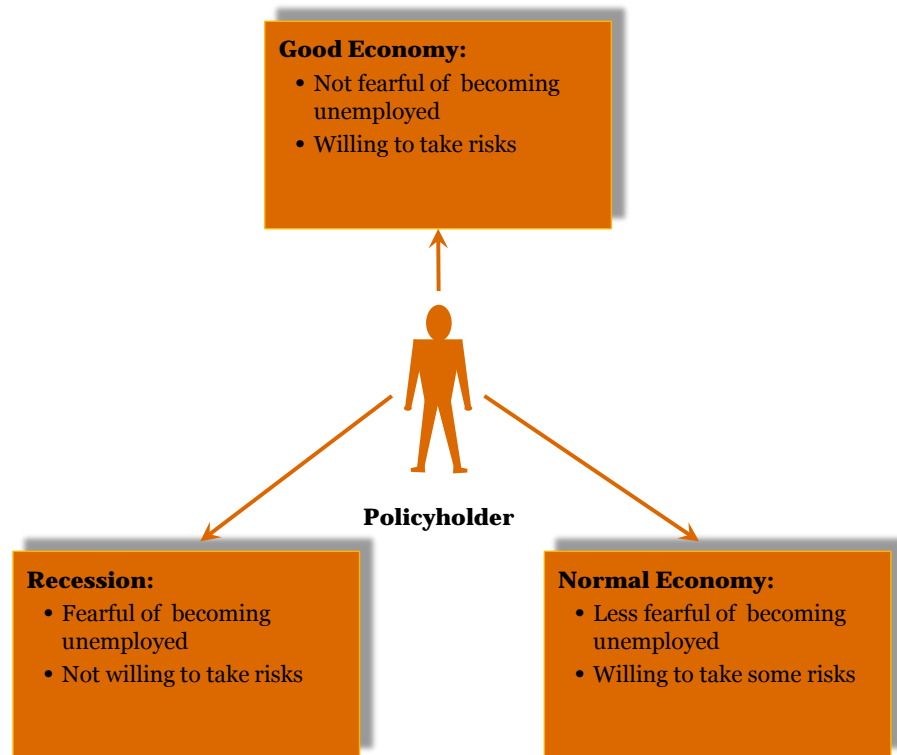
Economic

The behavior of individuals will be strongly influenced by their cognitive, emotional and social status, as well as the state of the economy. For example, in a good economy, policyholders are generally not fearful of becoming unemployed and are willing to take risks. Conversely, in a recession, policyholders are generally less confident about their employment situation and are less willing to take risks.

Exhibit 6: Economic Environment

Good Economy:
- Not fearful of becoming unemployed
- Willing to take risks

Policyholder

Recession:
- Fearful of becoming unemployed
- Not willing to take risks

Normal Economy:
- Less fearful of becoming unemployed
- Willing to take some risks

Similar to the life cycle of the policyholder, the state of the economy will affect:
1. Income sources
2. Spending habits
3. Savings rate
4. Asset allocations
5. Risk profile.

Of particular interest will be the effect that the state of the economy has on the decision-making process the policyholder goes through when tapping his investments to provide for shortfalls in the income sources (e.g., salary, Social Security and pension).

Regimes

A regime-switching framework will be used to simulate the behavior of individuals in three different economic states or regimes:

1. Good economy
2. Normal economy
3. Recession.

This paper defines these states using the percentage change in the real gross domestic product. The economy is in a good state when the real gross domestic product is growing at a rate greater than 5 percent. The economy is in a normal state when the real gross domestic product is growing at a rate between 0 percent and 5 percent. Finally, the economy is in a recessionary state when the real gross domestic product is contracting (i.e., the grow rate is less than 0 percent).[2]

Exhibit 7: Waiting Periods

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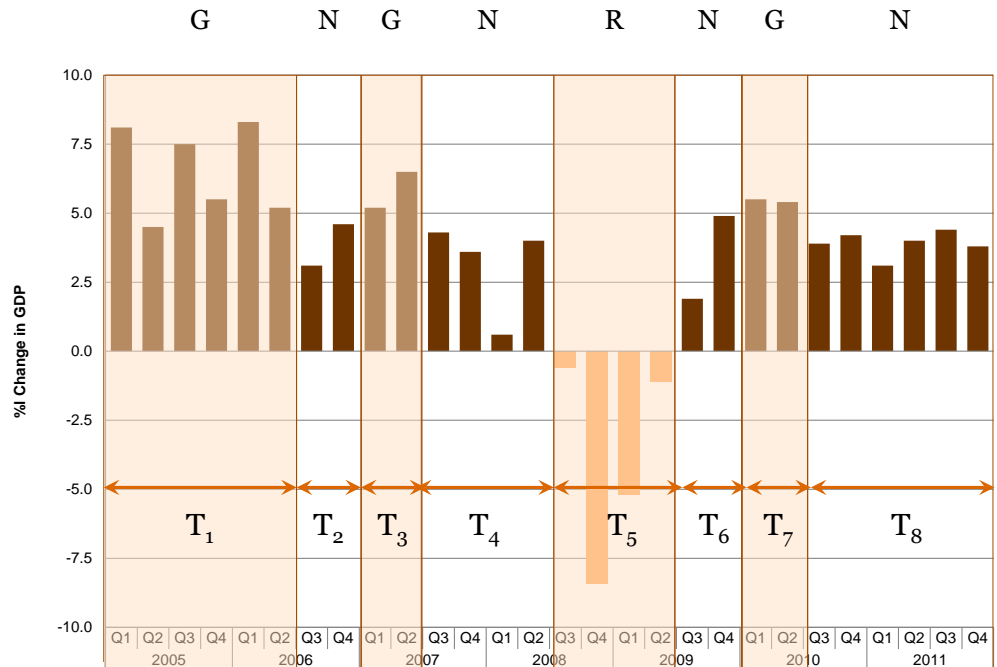
[2] This definition of recession is different from the official definition, which is two successive quarterly contractions.

The random variable $T_{i|r}$ will denote how long the economy is in a particular state. Algebraically,

$$T_{i|r} \sim Exponential\left(\lambda_r\right)$$

Where,

$T_{i|r}$ = number of time periods before the ith switch given the rth regime; and

λ_r = expected waiting time given the rth regime.

Using the quarterly percentage (%) change in the real gross domestic product from the first quarter of 1954 through the first quarter of 2012, the following exhibit shows the average waiting time for each state of the economy.

Exhibit 8: Average Waiting Times

State	Average Time
Good	2 Quarters
Normal	3 Quarters
Recession	1 Quarter

Transitions

At the end of the waiting period, the economy will switch to a different state. For example, if the economy is currently in a normal state and the end of the waiting period is reached, then it will switch to either a good economy or a recession.

$\Pr(G|N)$ — G

N → N → N

$\Pr(R|N)$ — R

$T_1 = 3$
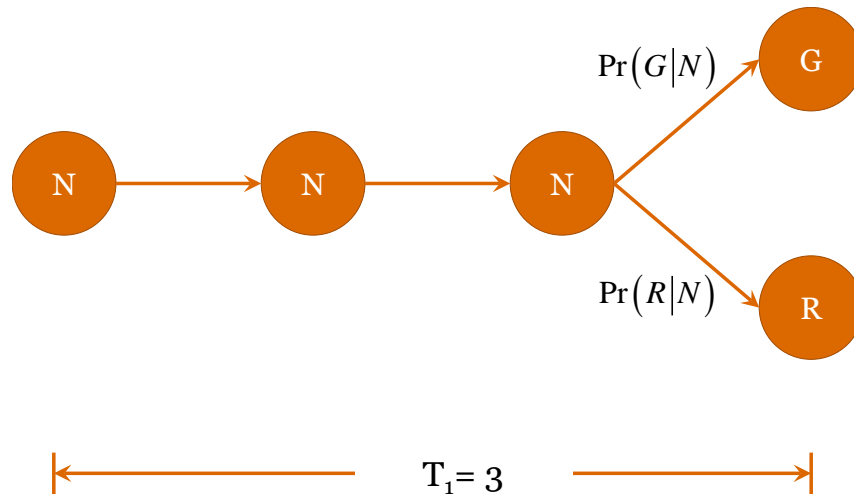
Returning again to the quarterly percentage change in the real gross domestic product from the first quarter of 1954 through the first quarter of 2012, the following exhibit shows the transition probabilities from one state of the economy to another state.

Exhibit 10: Transition Probabilities

| From Current State		To Future State		
		Good	Normal	Recession
	Good	0.00	0.88	0.12
	Normal	0.63	0.00	0.37
	Recession	0.13	0.87	0.00

Agents

Attributes

Attributes uniquely identify the policyholder. Five categories of attributes will be used to identify a policyholder:
1. Demographic
2. Occupational
3. Budgetary
4. Financial
5. Attitudinal.

Demographic attributes include the following about the policyholder:
1. Age
2. Gender
3. Marital status.
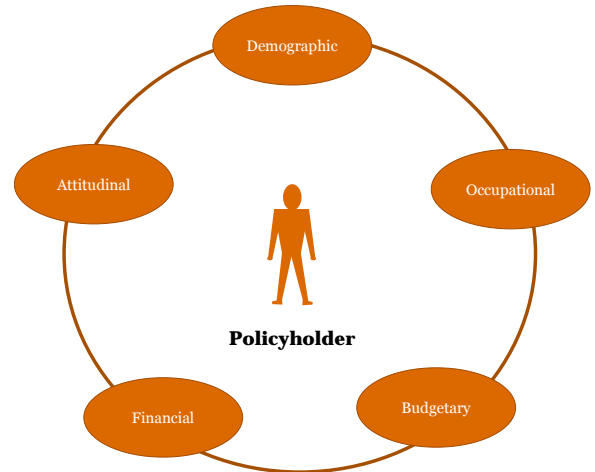
These attributes will be used for a variety of purposes such as where they are in the life cycle, spending needs, likelihood of needing medical care, and likelihood of dying.

Occupational attributes include the following about the policyholder:
1. Employment status
2. Occupation
3. Income.

These attributes will be used to determine policyholders' major source of their income, their likelihood of becoming unemployed, and the timing of their retirement.

Correlated with the demographic and occupational attributes, the budgetary attributes identify their spending habits. Their spending habits will be classified into three categories:
1. Nondiscretionary expenses
2. Discretionary expenses
3. Health care expenses.

Nondiscretionary expenses are expenses that the policyholder has limited control over, including costs for food, clothing and shelter. Discretionary expenses are expenses that the policyholder does have control over, including costs for travel, hobbies and charitable donations.

Also correlated with the demographic and occupational attributes, the financial attributes identify the level and type of financial assets they are likely to own. Specifically, the net worth of the policyholder will be allocated among five asset classes:[3]

1. Savings (i.e., checking, money market)
2. Certificates of deposit (CDs)
3. Mutual funds
4. Variable annuities
5. 401(k), 403(b) and individual retirement accounts (IRAs).

A policyholder will not necessarily own all five of these asset classes. Ownership will depend on several attributes such as age, income and net worth.

Attitudinal attributes describe the policyholder's attitude toward risk (i.e., risk profile). A policyholder's attitude toward risk will fall into one of three risk profiles:

1. Conservative
2. Moderate
3. Aggressive.

These risk profiles will be used to allocate the assets within mutual funds, 401(k) and variable annuities among equities, bonds and cash.

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[3] The primary residence of the policyholder will be ignored.

The allocation to equities, bonds and cash will change as the policyholder progresses through the life cycle. For example, the following exhibit shows the investment allocations of a policyholder with a moderate risk profile when the economy is in a good state.

Exhibit 11: Investment Allocations During a Good Economy

Asset Allocations (Good)

■ Cash %　■ Bond %　■ Equity %

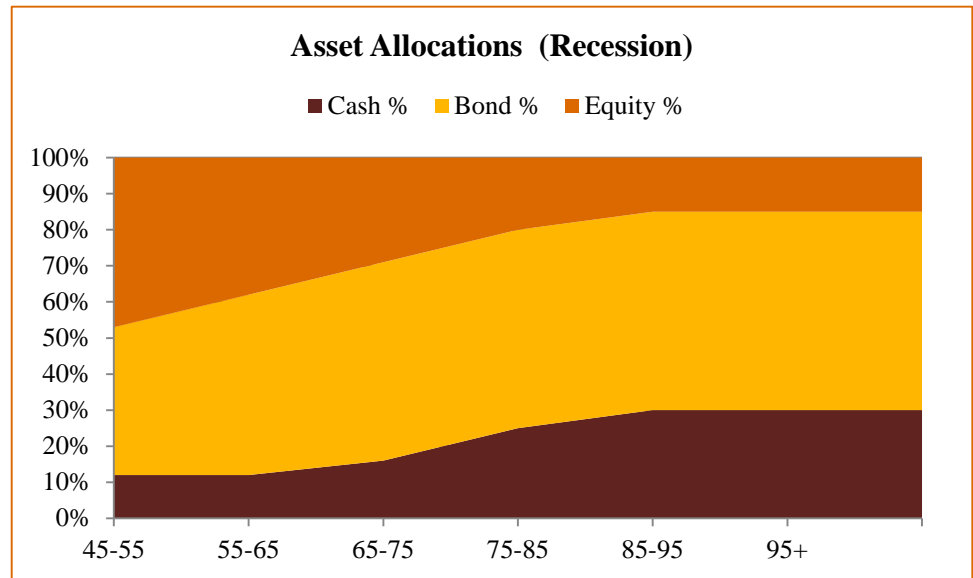| Age	45-55	55-65	65-75	75-85	85-95	95+
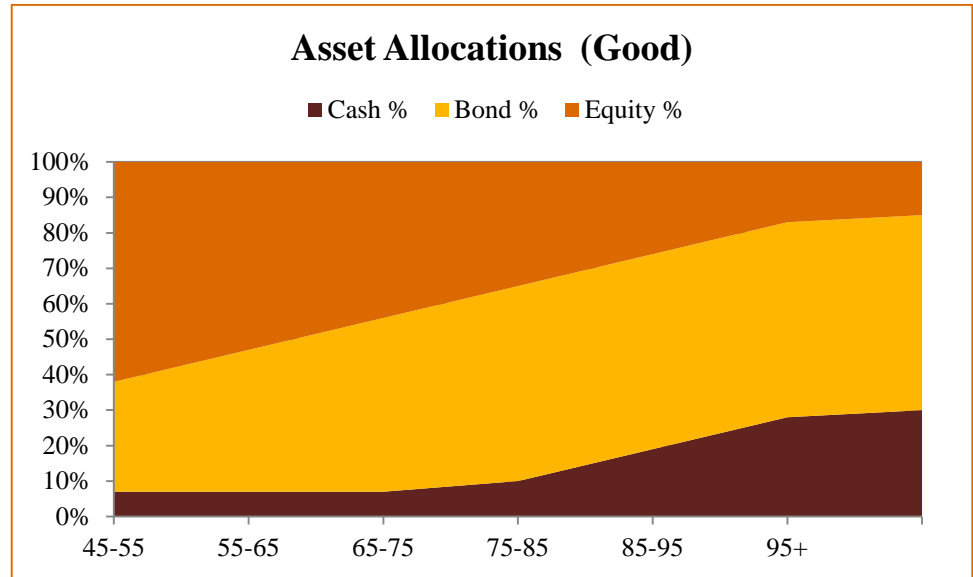
Allocations to bonds and cash increase as this policyholder ages. For example, at age 50, approximately 60 percent of his portfolio is in equities, 30 percent in bonds and 10 percent in cash; whereas, starting at age 95, approximately 20 percent is in equities, 60 percent in bonds and 20 percent in cash.

Similarly, the allocation to equities, bonds and cash will change when the economy switches states. For example, the following exhibit shows the investment allocations of a policyholder with a moderate risk profile when the economy is in a recessionary state.

Exhibit 12: Investment Allocations During a Recession

Asset Allocations (Recession)

■ Cash %   ■ Bond %   ■ Equity %

(Chart showing stacked area percentages across age bands 45-55, 55-65, 65-75, 75-85, 85-95, 95+ on the horizontal axis, and 0% to 100% on the vertical axis)

For example, in the previous exhibit, where the economy is in a good state, a 50-year-old policyholder with a moderate risk profile has approximately 60 percent of his portfolio invested in equities, 30 percent in bonds and 10 percent in cash. In contrast, when the economy is in a recession, this same policyholder is expected to have approximately 45 percent invested in equities, 40 percent in bonds and 15 percent in cash.