

## Appendix A

### Estimating the unfunded pension liability

Following the same methodology as [Hassl, Mattoon and Walstrum \(2018\)](#), we estimate the liability and the payment to the state's pension systems each year. The liability in year  $t$  is the liability from the previous year times the pension fund's expected rate of return, less any payments made to reduce the liability:

$$Liability_t = Liability_{t-1}(1 + Expected\ Return) - Payment_t$$

We must also calculate what the payment will be in each year. To do this, we allowed the size of the payment to change over time, while holding the tax rates constant. To derive the initial payment and the time it takes to pay down the unfunded liability, we must make assumptions about the natural increase in revenues due to economic growth. Since we are forecasting many years into the future, there is substantial uncertainty about what real secular income growth will be. For that reason, we present three scenarios, a low growth estimate of 1.35 percent yearly growth, which is the growth rate of adjusted gross income as reported by the Illinois Department of Revenue data, a mid-growth estimate of 3.35 percent, and a high growth scenario of 5.35 percent.

#### *Assumptions*

Unfunded liability	\$136.8 Billion
Expected return on pension assets	5%
Assumption 1: real growth	1.35%
Assumption 2: real growth	3.35%
Assumption 3: real growth	5.35%