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MODELING STATE CREDIT RISKS IN ILLINOIS AND INDIANA

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Data

The default probability models described in this paper are available at http://www.publicsector credit.org/illinois_v2.xlsm and http://www.publicsectorcredit.org/indiana_v2.xlsm.

Abstract

I use an open-source budget-simulation model to evaluate Illinois's credit risk and to compare it to that of Indiana, a neighboring state generally believed to have better fiscal management. Based on a review of the history and theory of state credit performance, I assume that a state will default if the aggregate of its interest and pension costs reaches 30 percent of total revenues. In Illinois, this ratio is currently 10 percent, compared to 4 percent in Indiana. My analysis finds that neither state will reach the critical threshold in the next few years under any reasonable economic scenario, suggesting no material default risk. Over the longer term, Illinois has some chance of reaching the default threshold, but it would likely be able to take policy actions to lower the ratio before then. If market participants accept my finding that Illinois does not have material default risk, Illinois's bond yields will fall, yielding cost savings for taxpayers as the state rolls over its debt.

***JEL* codes:** H74, C35, R51

Keywords: Illinois, Indiana, municipal bonds, credit, bankruptcy, default, interest, pensions

Modeling State Credit Risks in Illinois and Indiana

Marc D. Joffe

I. Modeling Illinois's Credit

Is Illinois in serious jeopardy of insolvency? The state has the lowest credit ratings in the nation, and its long-term general-obligation bonds yield 1 percent more than those issued by the most highly rated states, reflecting a market perception of significant credit risk. As a result, Illinois taxpayers pay tens of millions of dollars in additional interest charges—costs that could be avoided if the state were perceived to be a safe investment.

In this study, I estimate the risk of an Illinois bond default by performing a multiyear fiscal simulation. I also model a neighboring state, Indiana, which is perceived by rating agencies and the credit markets to be a much less risky issuer. The simulation analysis produces estimates of bond-default probability that can be used to determine whether the extra interest costs borne by Illinois taxpayers properly compensate bondholders for the incremental risk they are shouldering. In addition to modeling bond-default risk, the fiscal-simulation model also enables us to consider the impact of future interest and retirement costs on each state's ability to support its commitments to health, human services, education, and other programmatic spending priorities.

The simulation model I use in this analysis requires a default point: a fiscal threshold at which the state can be expected to become insolvent. Selecting a default point requires us to review the history of US state credit. After establishing this default point, I then consider a number of other key issues that will affect Illinois's long-term solvency. Specifically, I measure the state's existing debt burden and consider the likely trajectory of key expenditure areas, including pensions, other post-employment benefits (OPEB), education, and health care. Next, I

explain the modeling framework and assumptions, and I conclude by presenting the model results and their implications.

The model results suggest that Illinois state bonds carry very little credit risk and that Indiana's obligations are even less risky. While Illinois's fiscal policies are likely to have negative effects on future state residents and implications for other public policies, they are not sufficiently dangerous to worry bondholders.

II. A Brief History of Illinois Debt

Neither Illinois nor Indiana has a spotless credit record—both defaulted in the early 1840s. A lot has changed in the last 170 years, so it may be reasonable to ignore these historical payment failures. On the other hand, Reinhart and Rogoff (2009) demonstrate the benefits of considering very long time series when studying sovereign-debt crises. Because there has been only one default by a sovereign member of the Organisation of Economic Co-operation and Development since World War II and no default by a US state since that time, it is essential to consider the more distant past to see what a future default might look like.

Illinois took on substantial debt in 1836 and 1837 to finance the construction of a canal connecting the Illinois River to Lake Michigan, and to capitalize two state banks. Illinois bonds all carried interest rates of 6 percent. The high rate (by contemporary standards) reflected the speculative nature of these bonds. When the bonds were issued, the state did not generate sufficient tax revenue to service them. Buyers were effectively relying on the canal project to raise property values and thereby generate enough property-tax revenue for the state to make interest and principal payments.

A severe financial panic in 1837 was followed by a nationwide economic downturn in the late 1830s and early 1840s. Illinois continued issuing bonds to finance the canal, cover the state's operating expenses, and even fund interest payments on previously issued debt. By September 1841, the state had $13.6 million in bonds outstanding, all carrying a rate of 6 percent (US Congress, 1843). The approximately $800,000 in interest costs exceeded state revenues in 1841 by a factor of more than four (Krenkel, 1958). In December 1841, Illinois bonds were trading at less than 30 cents on the dollar. Lacking a market for new bonds and the revenue to service existing issues, the state defaulted in January 1842 (United States Magazine and Democratic Review, 1842).

Tax revenues eventually increased, especially after the opening of the canal in 1848. In 1857, the state fully emerged from default, and by 1880 Illinois's state debt was fully repaid (Moody's, 1934). Illinois remained debt-free until after World War I. Between 1918 and 1923, voters approved a series of bond issues totaling $235 million to fund highway construction, build the Illinois Waterway, and pay a bonus to war veterans. In 1932 and 1936, a further $50 million was approved to support emergency relief (Illinois state comptroller, various years).

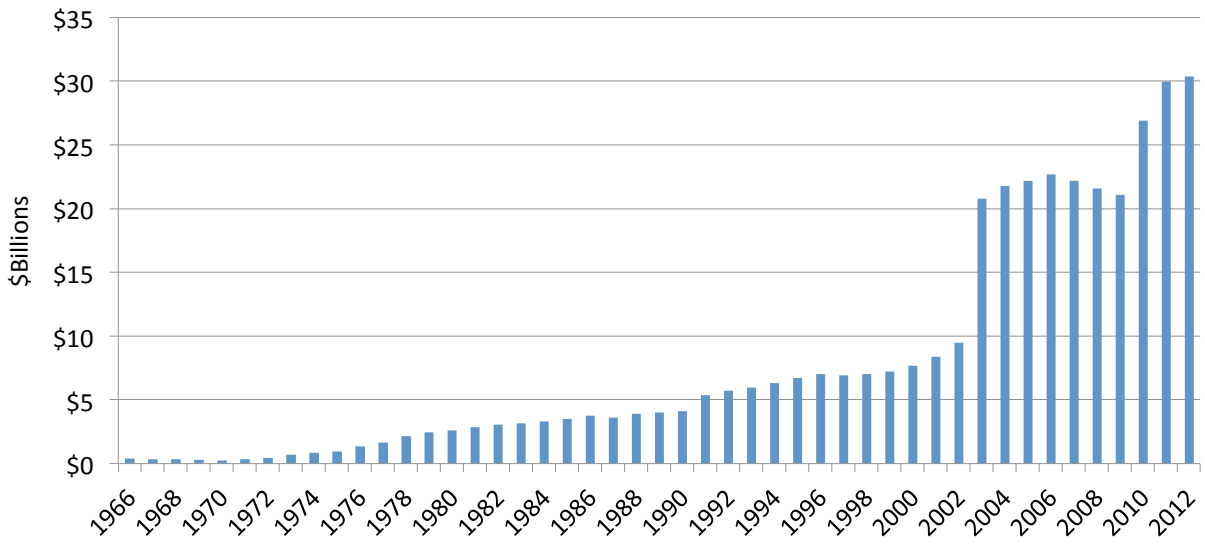
By the end of World War II only about $100 million of these bonds remained outstanding. In 1947 voters approved $385 million to pay bonuses to World War II veterans (Moody's, 1948). Little borrowing occurred during the next two decades, and by 1970 the state's general-obligation debt load of $266 million remained below its 1947 level—even in nominal terms.

It was only after 1970 that the state's debt burden began its relentless climb to today's levels (US Census Bureau, various years). In 1970, voters authorized $750 million in antipollution bonds (*Chicago Daily Defender*, 1971) and ratified a new state constitution that

allowed the legislature to unilaterally approve new bond issues. Under the previous constitution, general-obligation bonds required voter approval. In 1971, Republican Governor Richard Ogilvie proposed $900 million in additional bonds to fund transportation projects (*Wall Street Journal*, 1971).

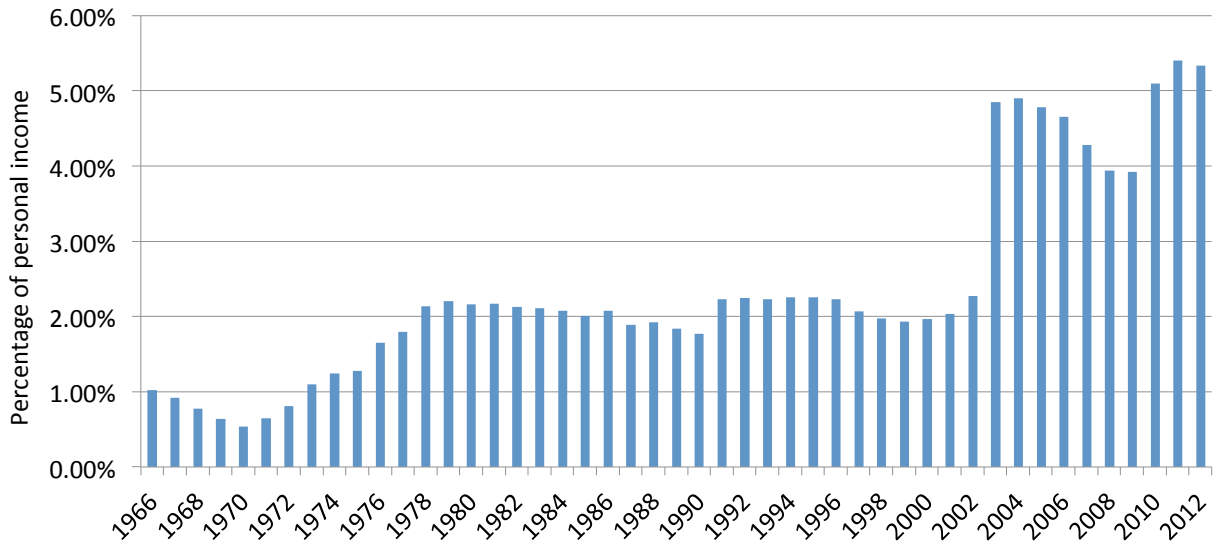
As shown in figure 1, since 1970 Illinois's direct debt (debt that is directly serviced from state tax revenues) has risen by a factor of over 100 in nominal dollars to its current level of roughly $30 billion. The escalation is dramatic even if changes in population, real income, and prices are taken into account. Figure 2 shows the ratio of direct debt to personal income—an economic aggregate that contains most components of GDP. After bottoming at 0.54 percent in 1970, this ratio has climbed to 5.34 percent in 2012.

Figure 1. Illinois Direct Debt



Sources: US Census Bureau, Illinois state comptroller Bonded Indebtedness and Long Term Obligations reports.

Figure 2. Illinois Direct Debt as a Percent of Personal Income



Sources: US Census Bureau, Bureau of Economic Analysis, Illinois state comptroller Bonded Indebtedness and Long Term Obligations reports.

III. Defaults in Other States and Analogous Subsovereign Entities

Like Illinois, Indiana also took on substantial debt ahead of the 1837 panic. In addition to canal building and bank capitalization, the state borrowed to support railroad construction (US Congress, 1843). As was the case with Illinois, Indiana's interest costs exceeded annual revenues (Wallis, 2005).

The Illinois and Indiana defaults were part of a wave of state insolvencies that followed the Panic of 1837 (Wallis, 2005). A second wave of state-bond defaults occurred in the former Confederate states during Reconstruction (Joffe, 2012a).

As reported by Fons, Randazzo, and Joffe (2011), the most recent US state-bond defaults occurred in 1933. In that year, Louisiana failed to make payments on certain bond issues due to the temporary closure of Hibernia Bank, where funds earmarked for debt-service payments had been deposited. This default, which was cured within three months, occurred before the inception

of federal deposit insurance, and would most likely not have happened had the FDIC been in place. Also, in late 1932 and early 1933 South Carolina was unable to redeem maturing bonds for cash and instead provided bondholders new market-rate bonds with later maturities. There is no evidence that the state missed interest payments. While this case is a default in bond-market terms, it did not result in a material loss of value to bondholders.

More serious was the case of Arkansas, which failed to make interest payments on March 1, 1933, and remained in a state of partial default until 1941, when the Reconstruction Finance Corporation—a federal agency created during the Depression—bought the state's debts at par. Ultimately, bondholders received all promised interest and principal, but on a substantially delayed basis. According to the contemporary Moody's bond manual (1934), Arkansas bonds traded as low as 40 cents on the dollar shortly after the initial default, representing a substantial loss to any bondholder that needed to liquidate at the time.

Over the last 140 years, the Arkansas situation is the only case in which a state defaulted on interest payments owed to individual investors as a result of a fiscal crisis. It is thus the most relevant default case available, and it merits further study. On the eve of the Arkansas default, interest costs accounted for roughly 30 percent of state revenues—far above the level for any other state. Other Depression-era government-bond defaults in the Anglophone world—including those of Australia, New Zealand, New South Wales (an Australian state) and Alberta (Canada)—were also accompanied by interest-to-revenue ratios of 30 percent or more (Joffe, 2012b).

Discussions about the risk of sovereign-debt crises often revolve around the debt-to-GDP ratio. In the 1930s, GDP was not measured. Economists have provided retrospective estimates of GDP at the national level, but not for individual states. The Bureau of Economic

Analysis (2006) has produced gross state product (GSP) estimates back only as far as 1963. Consequently, it is not possible to provide a precise estimate of Arkansas's debt-to-GSP ratio at the time of its default.

While an estimate of Arkansas's debt-to-GSP ratio in 1933 would be interesting, it would not—in my opinion—provide the best measure of maximum debt sustainability. The use of economic output as a denominator fails to capture differences between governments' ability to harvest revenues from their respective tax bases. Modern governments in advanced economies have been able to collect greater proportions of GDP in the form of taxes than governments that preside over large numbers of subsistence farmers—either historically or in developing countries today. Further, subsovereign governments like those of the US states typically have less revenue-collecting power than national governments. Consequently, the maximum sustainable debt-to-GDP ratio for states is likely to be lower than it is for sovereign powers.

Debt-to-GDP ratios also fail to capture differences in interest rates. Postwar Britain and modern Japan both sustained very high debt-to-GDP ratios because they faced very low interest rates. The ratio of interest expenses to total revenue incorporates both the level of interest rates and the government's ability to collect revenue from its tax base. Consequently, it is a more consistent measure of debt sustainability across time, and it takes into account levels of economic development and the government's degree of sovereignty (i.e., whether it is a nation, province, state, or locality).

The interest-to-revenue ratio also correctly captures the public-choice aspect of government default. The payment or nonpayment of debt-service obligations is not a macroeconomic aggregate; it is a *decision* made by a relatively small group of government officials. Critics of government debt modeling correctly observe that default is a political

decision, but the choices of individual actors—including political leaders—can be and have been modeled.[1]

In this case, the choice is between the embarrassment and loss of bond-market access triggered by default and the crowding out of programmatic spending arising from continued debt service. During a time of budgetary stress, the options are to cut payments to bondholders or beneficiaries. The dynamics of this choice were captured in a 1931 speech by New South Wales premier Jack Lang when he announced the Australian state's default on a £700,000 interest payment:

> Parliament in New South Wales was faced with an extremely awkward problem. It was committed to pay to oversea [*sic*] bondholders £700,000. The Government itself had not the money. It was informed, however, that this amount would be made available for shipment overseas if the Government needed it. Having in mind the reiterated statement that every £ of credit consumed by the Government meant a £ less for circulation among the primary and secondary industries, the Government was faced with a most difficult problem. If we took the £700,000 which the bank offered us, it meant that £700,000 worth of credit would have to be withdrawn from the primary and secondary industries of New South Wales. Default faced us on either hand. We could default, if we chose, to the farming community by withdrawing £700,000 from it, or we could default to our oversea creditors. Having to choose between our own people and those beyond our shores, we decided that the default should not be to our own citizens. (*Sydney Morning Herald*, 1931)

IV. Setting a Default Threshold

In the absence of more recent defaults by US states or comparable entities, the threshold of 30 percent interest expenses to revenue that was observed during the 1930s appears to be based on the best empirical evidence available. A cursory review of post-Depression state finance suggests that this barrier has not been approached in any state after the Arkansas default.

[1] Quantitative sovereign-default models have been proposed by Gappen, Gray, Lim, and Xiao (2008) as well as Manasse, Roubini, and Schimmelpfennig (2003). Hempel (1973) has proposed a model for US municipal-bond defaults. This author previously published a quantitative analysis of Canadian provincial credit risk (Joffe, 2012b).

It is thus possible that the default threshold today is lower than it was during the Depression because of changes in attitudes toward the sanctity of debt obligations and the political power of constituencies that receive income from the government. On the other hand, one major change militates against a lower threshold. In the default episodes of Depression-era Alberta, Arkansas, and New South Wales, the bondholders appear to have been mostly nonresidents. Because modern state income taxes usually exempt municipal-bond interest,[2] a state's bonds are now more often held by state residents. Consequently, bondholders are now a political constituency. Indeed, to the extent that municipal bondholders are older and have higher incomes than the average state resident, they should be more likely to vote and to contribute to campaigns than other constituents. The shifting of state debt into the hands of high-income state residents should thus act as a deterrent to default.

Another change that should be considered in modeling state default risk is the increased legal protection of pension benefits. Although public-employee pensions existed during the 1930s, they absorbed a smaller portion of government budgets and had yet to obtain constitutional protection. In Illinois, a new state constitution ratified in 1970 includes the following clause:

> Membership in any pension or retirement system of the State, any unit of local government or school district, or any agency or instrumentality thereof, shall be an enforceable contractual relationship, the benefits of which shall not be diminished or impaired. (Illinois General Assembly, 1970)

Although the recent policy debate in Illinois has included some discussion of the pension clause's interpretation, Illinois Senate parliamentarian Eric Madiar concluded his detailed study of the issue as follows:

[2] It should be noted that most Illinois state bonds are not exempt from state taxes.

> The Pension Clause not only makes a public employee's participation in a pension system an enforceable contractual relationship, but also constitutionally protects the pension benefit rights contained in the Pension Code when an employee joins a pension system, including employee contribution rates. The Clause also safeguards pension benefit enhancements that are later added during employment. Further, the Clause bars the General Assembly from adversely changing the benefit rights of current employees via unilateral action. And the Clause ensures that pensions will be paid even if a pension system defaults or is on the verge of default. (2012)

Given the protection now accorded pension benefits, I treat them as pari passu—legally equivalent—to debt service in the state's priority of payments. The default threshold I use is thus a 30 percent ratio of interest *and* pension expenses to total revenue. Other post-employment benefits (OPEB) such as retiree health care do not enjoy the same level of legal protection, so I have not added them to the numerator of the threshold equation.

V. Measuring State Debt

As noted previously, Illinois's direct, tax-supported debt has reached $30 billion after a rapid climb over the last four decades. But the State's annual Bonded Indebtedness and Long Term Obligations report (Illinois state comptroller, 2011) lists an additional $41 billion of revenue bonds. Unlike general- and special-obligation bonds, revenue bonds are not a direct claim on tax revenues. Instead they are issued in the name of various state-owned or state-supported facilities whose dedicated revenue streams are intended to provide the primary means of repayment. For example, a state university may issue a revenue bond with funds for repayment coming from tuition income.

However, revenue-bonds payments may be supported by taxes in certain cases. Illinois classifies revenue bonds into a number of categories, depending on the degree to which they represent potential claims on tax receipts. Indirect debt includes bonds whose debt service is

authorized through annual legislative appropriations. An example is Illinois Sports Facilities Authority bonds, which are partially repaid from Hotel Occupation tax revenues.

Contingent and moral-obligation debts[3] are normally paid from dedicated revenue streams, but if these revenues are insufficient, the state is expected to bail out the issuer. The comptroller's report (2011) lists a number of defaulted obligations in this category, including moral-obligation bonds issued by the Southeast Illinois Development Authority (SIDA) on behalf of Waste Recovery–Illinois, Spectrulite Consortium Inc., Alton Center Business Park, and Laclede Steel Company. A 2011 audit indicates that the Illinois General Assembly covered SIDA's losses on these four issues. A state payment was made to SIDA, which had been servicing the bonds after the original borrowers defaulted (Illinois auditor, 2011).

In the case of conduit debt, however, the state has no such obligation. Agencies that issue conduit debt, such as the Illinois Finance Authority (IFA), are merely assisting companies, nonprofits, and local governments with the task of raising capital for public purposes. A number of IFA-issued bonds have defaulted in recent years, and no state bailout has been forthcoming. Examples include Clare Oaks, a church-managed assisted-living facility (Illinois Finance Authority, 2012) and two Chicago-area ice rinks (Gallun, 2013).

Table 1 shows Illinois debt by type, along with analogous figures for Indiana and an indication of how each category of debt is treated in the models presented below. While direct and indirect debt are both included, other forms of debt are excluded because they are generally not serviced with tax revenues. A more advanced model might reasonably include a small portion of the state's contingent and moral-obligation debt as interest expense. The impact on results would be minor, however, because the contingent and moral obligation categories are relatively small and

[3] These two classes of debt have fairly complex definitions, which can be found in Illinois state comptroller (2011, p. 9).

it is not likely that the state would have to bail out a large proportion of the issuing organizations simultaneously. The table shows that Indiana is substantially less encumbered by debt than Illinois in all categories, even when the different size of the two economies is taken into account.

Table 1. Categories of Debt

	Illinois ($billions)	Indiana ($billions)	Model treatment
Direct debt	30.0	0.0	Included
Indirect debt	2.8	1.2	Included
Moral obligation/contingent	5.7	0.0	Excluded
Conduit	32.3	11.3	Excluded
Total direct and indirect	32.8	1.2	Included
As percentage of GSP	*5.77%*	*0.51%*	
Total all categories	70.8	12.5	Excluded
As percentage of GSP	*12.45%*	*5.27%*	
Gross state product	568.8	237.1	

Sources: Illinois state comptroller 2011 Bonded Indebtedness and Long Term Obligations report (the 2012 report was not available in time to be included in this paper, but a review of monthly debt reports shows no significant change in direct debt); Indiana 2012 Comprehensive Annual Financial Report; Bureau of Economic Analysis.

VI. Pensions

Illinois's pension problems have received substantial publicity. The state recently settled an SEC investigation by admitting that it had failed to adequately inform municipal-bond investors about pension underfunding between 2005 and 2009 (US Securities and Exchange Commission, 2013). Since then, the state has improved its disclosures.

Table 2 presents selected statistics as of June 30, 2012, for the five pension funds to which the state government contributes. All of them have low funding ratios. In the aggregate, the five funds have $159 billion in liabilities (discounted back to present value) and $62 billion

in assets, producing a funded ratio of 39 percent and an unfunded liability of $97 billion. Plan actuaries apply a smoothing mechanism to reduce the volatility of plan assets in order to calculate contribution rates. For Illinois's five funds, these actuarially smoothed valuations of the assets add up to $64 billion, or 40 percent of liabilities. The unfunded liability using this method is $95 billion, or 60 percent of liabilities.

Worse, the liabilities are being discounted at rates of between 7 percent and 8 percent, based on the return assumption used by the various funds. Most of the economic literature recommends the use of a substantially lower discount rate (see, for example, Novy-Marx and Rauh, 2011). If a lower rate were applied, the present value of liabilities would be higher and the funding ratio would be even lower. Ingram and Dabrowski (2012) estimate that Illinois's unfunded liabilities would exceed $200 billion if a 4.1 percent discount rate were applied. The funded ratio would be less than 25 percent.

When considering the impact of underfunded pensions on Illinois's solvency, it is worth evaluating the implications of the extreme case, in which the assets of all five systems are exhausted. If that were to happen, the state government would have to cover all benefit payments and administrative expenses from revenues on a pay-as-you-go basis. Offsetting these annual costs would be the contributions withheld from the salaries of current employees and (in the case of the Teacher's Retirement Fund) school district contributions.

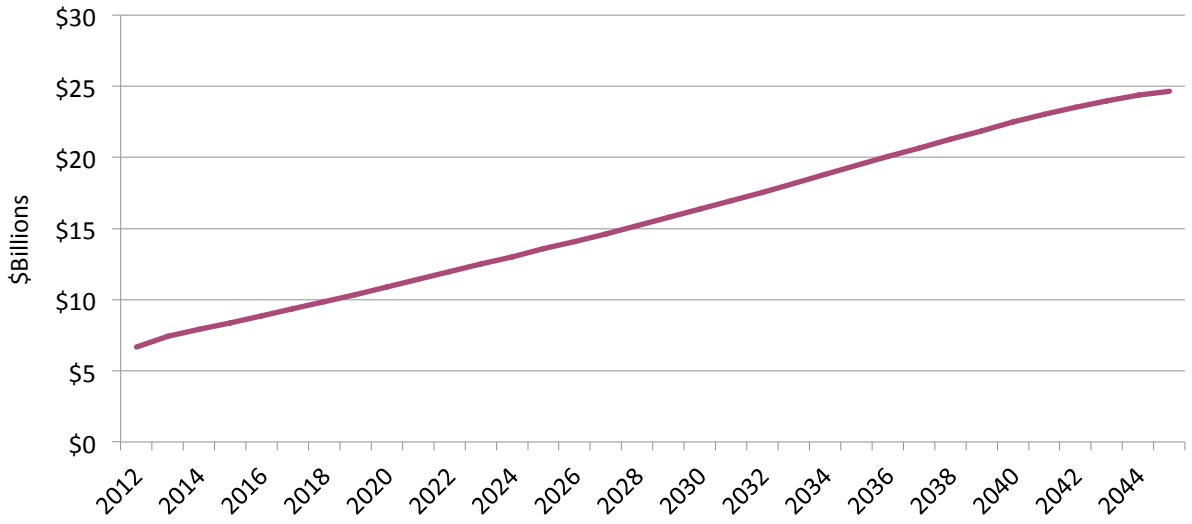
In 2012, the state contributed $4.9 billion to its various pension funds, but it would have been compelled to contribute $6.7 billion if it had been operating on a pay-as-you-go basis. Figure 3 uses projections of employee contributions and benefits from each fund's actuarial report to show how this pay-as-you-go pension cost is expected to evolve over time. By 2045, the state's potential burden almost quintuples to $24.6 billion.

Table 2. Illinois Pension Fund Data, June 30, 2012 (dollar amounts in millions)

	Teachers	University	State employees	Legislators	Judges			
	TRS	SURS	SERS	GARS	JRS	TOTAL		
Active members	133,113	71,056	62,732	176	968	268,045	2.08%	of state population
All beneficiaries	105,447	54,532	62,788	414	1056	224,237	1.74%	of state population
Market value of assets	$36,517	$13,705	$10,961	$53	$578	$61,813		
Actuarial value of assets	$37,945	$13,950	$11,477	$56	$601	$64,030		
Actuarially accrued liability	$90,025	$33,170	$33,091	$303	$2,022	$158,612		
Unfunded actuarially accrued liabilities	$52,080	$19,220	$21,614	$247	$1,420	$94,582		
Funded ratio (based on market value)	40.56%	41.32%	33.12%	17.38%	28.59%	38.97%		
Funded ratio (based on actuarial value)	42.15%	42.06%	34.68%	18.48%	29.74%	40.37%		
Benefits and expenses paid	$4,657	$1,822	$1,667	$20	$108	$8,274		
Employee and district contributions	$1,073	$258	$259	$2	$17	$1,608		
Costs borne by portfolio or the state	$3,585	$1,564	$1,407	$18	$91	$6,666	10.04%	of revenues
Actual state contribution	$2,406	$986	$1,391	$11	$64	$4,858	7.32%	of revenues
Selected actuarial assumptions								
Investment return	8.00%	7.75%	7.75%	7.00%	7.00%			
Inflation rate	3.25%	2.75%	3.00%	3.00%	3.00%			
Group size growth	0.00%	0.00%	0.00%	0.00%	0.00%			

Sources: Teachers' Retirement System (TRS), State Universities Retirement System (SURS), State Employees' Retirement System (SERS), General Assembly Retirement System (GARS), and Judges' Retirement System (JRS) 2012 Comprehensive Annual Financial Reports and Actuarial Reports.

Figure 3. Projected Illinois "Pay as You Go" State Pension Cost



Sources: Teachers' Retirement System (TRS), State Universities Retirement System (SURS), State Employees' Retirement System (SERS), General Assembly Retirement System (GARS), and Judges' Retirement System (JRS) 2012 Comprehensive Annual Financial Reports and Actuarial Reports.

It is important to place these numbers into the context of the overall budget picture. According to figures provided to the author by the Institute of Government and Public Affairs (IGPA) Fiscal Futures project, the state's consolidated revenue was $66.4 billion in fiscal year (FY) 2012 (IGPA, personal communication). The state's actual pension contributions totaled 7.3 percent of revenue, and would have been 10.0 percent in the absence of pension funding. Thus the debate over pension funding revolves around $1.8 billion, or 2.7 percent, of state revenue—a substantial amount, but not one that would likely trigger insolvency.

Projecting into the future shows some surprising results. While pension costs are expected to increase, state revenues will also rise. In the 31 fiscal years from 1981 to 2012, appropriated state revenues (which approximate consolidated revenue[4]) increased at an

[4] While much discussion of state finance revolves around general-fund totals, it is often beneficial to think in terms of the state's overall revenue and expenditures, since states can readily borrow and transfer money between their general and other funds. IGPA has estimated Illinois's consolidated (or grand-total) revenue and expenditure back to

annualized rate of 6.32 percent. This is somewhat higher than the 4.82 percent yearly growth in nominal personal income over the same period, with the difference largely explained by tax hikes imposed during the period. Although revenue growth may be slower over the next three decades (due to lower fertility rates, population aging, and disincentives arising from higher income taxes), it is still likely to be substantial—if for no other reason than simple inflation. Moody's Analytics (2013) projects that Illinois's annual personal-income growth will average roughly 4.5 percent through 2021.

Figure 4 shows the ratio of future pay-as-you-go state pension costs to revenues, assuming a variety of plausible future growth rates ranging from 3 percent to 6 percent annually. These revenue growth rates are plausible without further tax increases, since they bracket the Moody's Analytics forecast of personal-income growth.

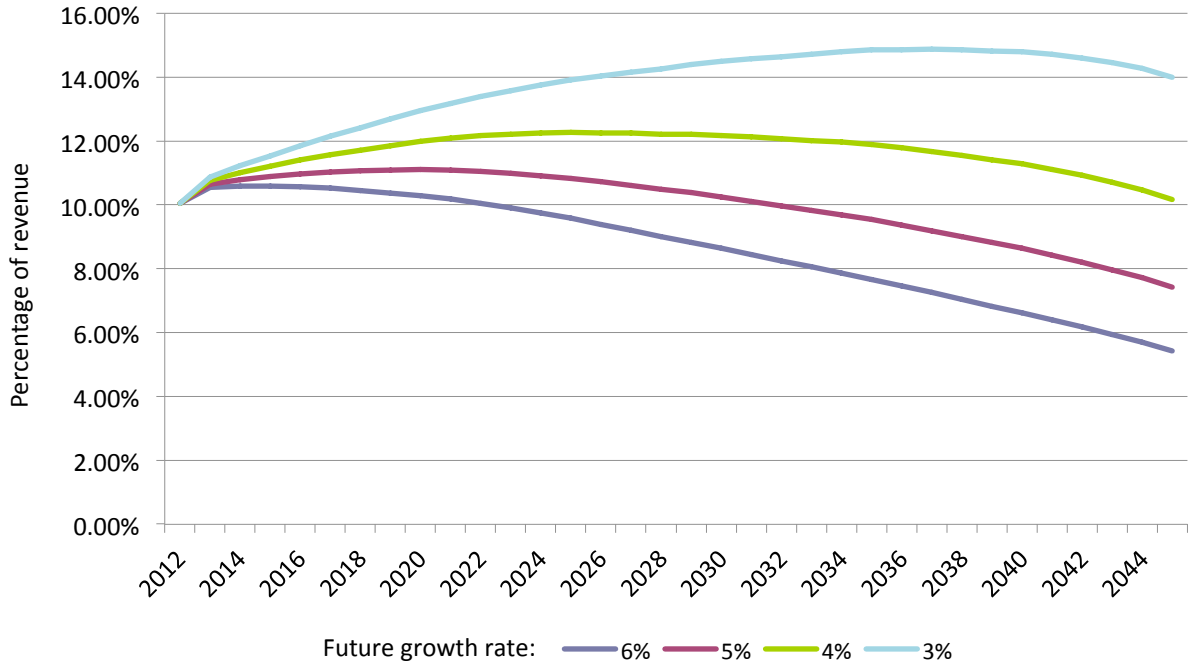
At a growth rate of 5 percent or 6 percent, the ratio in 2045 is actually below its 2012 level. If annual growth slows to 4 percent, the ratio peaks at just over 12 percent before falling back to current levels by 2045. Finally, in the event of 3 percent annual growth, the ratio approaches 15 percent.

Two factors restrain the future growth of state pension expenses. First, employees who joined the state work force after January 1, 2011, are eligible for less generous retirement benefits. As these new "tier II" hires begin to replace older "tier I" employees in the beneficiary population, benefit growth slows down. Second, actuaries assume no growth in the state work force over time. This assumption may be overly optimistic, but it is worth noting that overall state employment has shrunk in recent years. For example, active membership in the State Employees' Retirement System (SERS) declined from 70,179 in 2003 to 62,372 in 2012 (State

1997. Before that, it is reasonable to use total "appropriated funds" from state publications, because only a small portion of state financial activities involve unappropriated funds.

Employees' Retirement System of Illinois, 2012). During this period, membership increased in two years and decreased in seven years. On the other hand, the number of teachers participating in the Teacher's Retirement System (TRS) rose sharply from 2003 to 2008 but then gradually declined each year thereafter (Teachers' Retirement System of the State of Illinois, 2012a).

Figure 4. Projected Illinois "Pay as You Go" State Pension Cost as a Percentage of Revenue



Sources: Teachers' Retirement System (TRS), State Universities Retirement System (SURS), State Employees' Retirement System (SERS), General Assembly Retirement System (GARS), and Judges' Retirement System (JRS) 2012 Comprehensive Annual Financial Reports and Actuarial Reports.

It is worth emphasizing that the pay-as-you-go scenario discussed here is a boundary condition. In all likelihood, the pension funds will maintain some level of assets and should thus be able to partially offset future benefit and administrative costs. In theory, state contributions in a given year could exceed the pay-as-you-go costs described here, because current Illinois law

calls for increasing funding levels to 90 percent by 2045. But lawmakers could easily avoid making these extra contributions. While the constitution requires the state to pay pensioners, it does not mandate any degree of prefunding. If the state were facing a solvency crisis, it would not need to increase funding levels and should be expected not to do so. Indeed, during previous periods of fiscal strain, the state has reduced contributions—giving rise to the underfunded situation Illinois is in today.

As shown in table 3, Indiana's pension-funding situation is significantly healthier than that of Illinois. The state's aggregate pension funding is, however, weighed down by its Teacher's Retirement Fund (TRF). Indiana's TRF was established in 1921 as an explicitly pay-as-you-go system, demonstrating that pension underfunding is not a new phenomenon. In 1996, the original pay-as-you-go pension account was closed to new employees. They were assigned to a new pension account that is prefunded by member contributions and a 7.5 percent employer contribution from local school corporations. The legislature also created a Pension Stabilization Fund with proceeds from the state lottery and other revenues to augment the funding level of both accounts (Indiana Public Retirement System, 2012; Indiana Legislative Services Agency, 2011). As the pool of pre-1996 members shrinks, the overall funded status of TRF will continue to improve.

Table 3. Indiana Pension Fund Data, June 30, 2012 (dollar amounts in millions)

	Public employees	Teachers				
	PERF	TRF	All other	TOTAL		
Active members	145,519	70,573	14,611	230,703	3.53%	of state population
All beneficiaries	72,992	49,971	3,850	126,813	1.94%	of state population
Actuarial information						
Market value of assets	$12,244	$9,077	$4,243	$25,564		
Actuarial value of assets	$12,088	$8,915	$4,154	$25,156		
Actuarial accrued liabilities	$15,784	$20,860	$4,734	$41,379		
Unfunded actuarially accrued liabilities	$3,696	$11,946	$581	$16,222		
Funded ratio (based on market value)	77.57%	43.51%	89.63%	61.78%		
Funded ratio (based on actuarial value)	76.58%	42.73%	87.74%	60.80%		
Benefits and expenses paid	$774	$1,295	$115	$2,184		
Employee contributions	$159	$130	$47	$336		
Costs net of employee contributions	$615	$1,165	$69	$1,849		
Local agency responsibility	$394	$195	$69	$657		
State responsibility	$221	$971	$0	$1,192	4.06%	of revenues
Actual employer contributions	$398	$945	$352	$1,696		
Actual state contribution	$249	$824	$170	$1,243	4.24%	of revenues
Selected actuarial assumptions						
Investment return	6.75%	6.75%	6.75%			
Inflation rate	3.00%	3.00%	3.00%			

Sources: Indiana Public Retirement System (INPRS) 2012 comprehensive annual financial report and Indiana governor's budget.

Because Indiana's Public Employees' Retirement Fund (PERF) and a couple of smaller funds are multi-employer systems, and because the burden-sharing relationship between the state and local school corporations for TRF is complex, the state-responsibility figures shown in table 3 are rough estimates. Further, the Indiana systems don't all publish annual-benefit and employee-contribution forecasts, so projecting the growth of the state's pay-as-you-go pension cost is not straightforward. In my analysis, I assume that Indiana's pay-as-you-go pension cost grows at the same rate as that of Illinois. As will be seen, Indiana is so far away from the default threshold that changing this growth-rate assumption would not materially affect its default-probability results.

VII. Employee Health Insurance and OPEB

Much of the recent debate about state and local-government solvency has focused on other post-employment benefits (OPEB). Due to a change in government accounting standards, governments have been required to report unfunded actuarially accrued liabilities (UAAL) related to OPEB since 2007. Many of the newly reported UAAL numbers were shocking, and Illinois's were no exception. According to the state's most recently available Comprehensive Annual Financial Report, Illinois faced an OPEB UAAL of $33.3 billion at the end of FY 2009—an amount that was roughly equivalent to its annual general-fund budget.

But, as with pensions, the real solvency implications of OPEB revolve around annual costs and how those fit into the larger picture of revenue and spending. The Comprehensive Annual Financial Report (CAFR) reports $501 million in OPEB expenses for FY 2011, which was about 1.5 percent of general-fund revenue for that year and less than 1 percent of total revenues (Indiana Public Retirement System, 2012).

Illinois pays for employee and retiree health insurance together, so there are no long time series of OPEB costs. According to figures from the IGPA Fiscal Futures project, Illinois's group health-insurance costs rose from $719 million in 1997 to $2.028 billion in 2012, reflecting an annual growth rate of 7.19 percent—much faster than the 3.63 percent annual growth in personal income over the same period. A likely driver of this rapid growth is the high rate of health-cost inflation, a trend that can reasonably be expected to continue.

One factor may restrain the future growth of OPEB costs. Per retiree costs to the state are much lower for Medicare-eligible beneficiaries than for those not eligible for the federal program. According to the CAFR, the 2011 costs for Medicare-eligible beneficiaries were $4,483, compared with $10,697 for those not eligible (these costs applied to retirees not choosing HMOs; retirees using HMOs paid less). Assuming a stable workforce and gradually increasing life expectancies, the Medicare-eligible proportion of the retiree population should gradually rise, limiting the growth of state OPEB costs.

VIII. Education

Since 1981, Illinois's appropriated-fund expenditures on education have increased at an annual rate of 4.52 percent. This is significantly lower than the rate of overall spending and revenue growth, and slightly below the rate of growth in personal income (4.82 percent).

The growth of education spending has been relatively muted for two main reasons: (1) limited growth in the number of K–12 pupils and (2) periodic budget cuts to higher education. According to the Illinois State Board of Education (2004, 2012) statistics, K–12 enrollment increased from 1.956 million in the 1980–81 school year to 2.001 million in 2011–12. This 2.3

percent increase in enrollment contrasts with a 12.5 percent rise in state population—indicative of an aging population.

Figures reproduced in the State Budget Crisis Task Force's report (2012) show significant cuts to higher-education spending from 2002 to 2004 and a flattening since 2008. In Illinois, as in other states, higher education has proved easier to cut than other budget items. State colleges and universities have responded to reduced government funding through a mixture of cost savings and tuition increases. In the model, I assume that education spending rises with GSP.

IX. Health and Social Services

Appropriated-fund expenditures on health and social services increased at an annual rate of 7.74 percent between 1981 and 2012, outstripping the rate of personal-income growth by about 3 percent. The rapid rate of increase appears to be primarily attributable to growth in the state's Medicaid program. Unfortunately, state financial reports do not specifically break out Medicaid expenditures. Further, Illinois has had a history of manipulating Medicaid expenditures to achieve the illusion of budget balance by delaying provider reimbursements (State Budget Crisis Taskforce, 2012).

It is possible to estimate these amounts from federal sources. According to Kaiser Family Foundation data quoted by the State Budget Crisis Task Force (2012), spending on Medicaid and the Children's Health Improvement Plan accounted for 23 percent of total state spending in FY 2010. Annual growth in Illinois Medicaid spending was 11.1 percent between 1990 and 2001, gradually decelerating to 6.6 percent annually between 2007 and 2010.

Causes of the rapid increase in Medicaid spending include health-cost inflation and rising caseloads. According to statistics published by the Institute for Illinois Fiscal Sustainability

(2012, 2013), Medicaid enrollment more than doubled between 2000 and 2012, rising from 1.37 million to 2.78 million beneficiaries. This rate of increase is significantly faster than the national average, and it contrasts sharply with the 4 percent increase in overall state population over the same period.

On a per enrollee basis, Medicaid spending varies by type of beneficiary. Medicaid costs for children and nondisabled adults are lower than those for disabled adults and seniors. Fortunately for the state budget, enrollee growth was concentrated in the lower-cost beneficiary groups. As the Institute for Illinois Fiscal Stability (2012) reports, most of the growth in the beneficiary population before the 2008 recession was the result of a number of eligibility expansions during the early part of the last decade. For example, the eligibility threshold for the state's FamilyCare program, which covers parents of low-income children, increased from 36 percent to 185 percent of the federal poverty level (FPL).

This limit exceeds the 133 percent level specified by the federal Affordable Care Act (ACA). A 2012 Medicaid-reform law reduced the FamilyCare threshold to the federal limit and implemented a number of other changes designed to reduce state health-spending costs by $1.6 billion. The legislation was also intended to generate an additional $1.1 billion in annual revenue by increasing the cigarette tax by $1 per pack (Lubell, 2012).

Although ACA permits Illinois to deny coverage to families with incomes between 133 percent and 185 percent of FPL, it does mandate coverage for single adults with incomes up to 133 percent of FPL starting in 2014. The Supreme Court has ruled that states are not required to implement the Medicaid expansion outlined in ACA, but Illinois Governor Pat Quinn has expressed an intention to do so (Blahous, 2013). Between 2014 and 2016, incremental state costs arising from this expansion will be fully offset by the federal government. Then the federal

portion drops to 95 percent in 2017, 94 percent in 2018, 93 percent in 2019, and to a permanent rate of 90 percent in 2020. Illinois Healthcare and Family Services (2012) estimates that the incremental cost of insuring single adults in 2020 will be $2.1 billion, of which the federal government will cover $1.89 billion. Healthcare and Family Services also estimates that the expansion for single adults will add 342,000 beneficiaries to the rolls by 2017.

Aside from this new group, it is unlikely that the recent trend of enrollment increases will continue. Indeed, the Institute for Illinois Fiscal Sustainability (2012) cites evidence that a significant number of new enrollees are ineligible—because they exceed the income limit or actually live out of state—and lists steps that Healthcare and Family Services is taking to enforce eligibility rules.

X. Modeling Framework

Illinois and Indiana revenues, expenditures, and future debt levels are modeled using an open-source simulation tool named PSCF—Public Sector Credit Framework. PSCF enables a user to set up a budget simulation in a workbook, which is then executed by an Excel add-in.[5]

The reason for using a simulation is that a number of important variables are not known with any precision. The primary examples are future interest rates, economic growth, and inflation. A state's budget performance is heavily reliant on how these values develop over time. Long-term budget forecasts, like those issued by CBO, use point estimates for these variables and thus contain substantial forecast error. A simulation, by contrast, can provide a range of outcomes, which will likely bracket the ultimate result. The simulation framework can also take into account uncertainty over future policy changes.

[5] The PSCF model framework itself and its previous application to the US federal budget and to California's budget are discussed in PF2 Securities Evaluations (2012).

The Monte Carlo simulation technique used by PSCF requires that random numbers be generated for each simulation trial and that these random numbers be used in the subsequent calculations so that each trial produces unique results. PSCF leverages an open-source library to produce these random numbers, which may be uniformly distributed (with any given value having an equal chance of being generated), normally distributed (with values being concentrated close to the mean and taking the shape of a bell curve) or Cauchy-Lorentz distributed (discussed below).

PSCF models use random numbers to drive macroeconomic variables, which in turn drive revenue and expenditure projections. The difference between revenues and expenditures is typically treated as a change in the stock of outstanding debt. Interest costs can then be a function of this stock and an average interest rate paid by the government.

PSCF compares each year's simulated fiscal data to a user-specified default threshold. As discussed earlier, the threshold I use is interest and pension expenses divided by total revenue exceeding 30 percent. Because this parameter is specified by the user, because the software tool is open-source, and because the model is being published by the Mercatus Center at George Mason University, any Excel user can download the model and rerun it with his or her own assumptions.

XI. Modeling Assumptions

Most categories of state revenue and expenditure are assumed to be primarily a function of gross state product, so most of the modeling apparatus focuses on generating plausible GSP growth outcomes. Using a method documented by Edwards (2003), GSP growth is assumed to be a function of changes in labor-force size, labor-force participation, and productivity.

Given the importance of labor-force size, the model includes an extensive demographic process. Population is simulated by single-year age cohorts up to 85. The initial cohort sizes are based on census data. In each subsequent year, the population in a given cohort is projected to be the size of the one-year younger cohort from the previous year, plus net migration, less deaths. The age 0–1 cohort is based on estimated births. The number of births is a function of the fertility rate and the female population between 15 and 44 (which is assumed to be half the total population in that age bracket).

Future death rates are derived using the Lee-Carter method (Lee, 2000). Net migration is assumed to be flat relative to the most recently available actual data (+19,000 in Illinois and +6,000 in Indiana) and is evenly distributed across all age groups. The equations for birth and death rates include a random disturbance factor so that each simulation trial produces a different, plausible result.

Productivity growth is projected to move randomly around its national average of just over 2 percent since 1981. Labor-force participation for those below age 65 is simulated through the use of an autoregression equation derived from historical data. The equation contains an error term that references a PSCF-generated random number. The forecast series are similar to random walks, but have a tendency to revert toward long-term historical means. Senior labor-force participation has gradually increased in recent decades as more people remain healthy after reaching age 65. This trend is assumed to continue in my PSCF models.

Inflation is also projected with an autoregressive function based on historical actual values. Interest rates are assumed to be a function of both prior-year interest rates and prior-year inflation in recognition of the fact that bond investors usually expect to be compensated for losses in purchasing power. The interest-rate equation is fitted against a series of historical

municipal-bond yields. For Illinois, the constant in this equation has been increased to reflect the state's higher perceived credit risk.

Current interest rates do not fully determine a state's interest costs, because most of a state's debt obligations are issued for long terms at fixed interest rates. A review of Illinois's direct debt-maturity schedule suggests that the average maturity of the state's bonds is about 10 years. Consequently, I assume that 10 percent of the state's debt turns over in a given year. Only this portion—plus debt newly issued to cover deficits or capital financing—is assumed to attract the new interest rate. In the model, I represent this assumption by calculating a weighted-average interest rate, taking into account both the new and rolled-over debt as well as the existing stock of debt that is not being rolled over.

For FY 2013 through FY 2016, the Governor's Office of Management and Budget (2012) provides forecasts for general-fund revenues. These revenue assumptions are implicitly based on forecasts of economic growth and inflation. In the simulation, I find the difference between these forecasts and my projected nominal GSP for each trial. I then change the governor's revenue forecasts proportionately.

Since the governor's budget is based on current law, it assumes that existing temporary personal and corporate income-tax hikes will end on January 1, 2015. This results in falling income-tax revenue in FY 2015 and FY 2016. Based on conversations with local political observers, I assume a 95 percent probability that the tax increases will be made permanent or the revenue will be otherwise replaced. Illinois has a Democratic governor and Democratic supermajorities in both houses of its legislature. While raising taxes is politically distasteful, most of these officials have done it before, and it is reasonable to expect that they will do it again—given the state's ongoing fiscal stress.

Thus, 95 percent of my simulation trials do not include the revenue loss forecast by OMB. I achieve this proportion by generating a uniformly distributed random number between 0 and 1 during each trial and then testing the number to determine whether it is less than or equal to 0.95. If the random number meets this criterion, I assume that the tax increase will be extended and add the associated revenue.

While I vary forecast revenues with projected GDP, I do not take this approach for spending. My approach to interest expenses was discussed above, and a detailed description of my pension-cost simulation follows in the next section. I assume that education and other operating expenses conform to the governor's budget. I assign a small negative elasticity to health and human-service expenses on the assumption that these contain automatic stabilizers that will vary inversely with economic performance. If, for example, the economy performs more poorly than expected, more people can be expected to sign up for Medicaid and Temporary Assistance for Needy Families.

From 2014 forward, health costs are increased to reflect the assumption of ACA coverage expansion in Illinois. For Illinois, federal and state incremental costs are derived from Illinois Healthcare and Family Services (2012). For Indiana, state amounts are derived from Milliman (2012), and federal costs are assumed to be 40 percent of Illinois's.

Budget estimates are not available for special-fund expenditures nor for general-fund expenditures after 2015. These are assumed to grow with gross state product, except for health and human-service expenditures, which are assumed to grow 3 percent faster than gross state product—consistent with their historical behavior. On top of this growth, I add incremental costs associated with the coverage expansion mandated by the Affordable Care Act as estimated by

Illinois Healthcare and Family Services (2012). The federal share of this cost is added to federal-source revenues.

XII. Modeling Pension Expenses

For both Illinois and Indiana, the state's annual pension costs are assumed to be the maximum state responsibility discussed earlier minus a contribution from pension-fund assets. This contribution is assumed to be a fixed proportion of fund assets. Each year's fund assets are calculated according to the following equation:

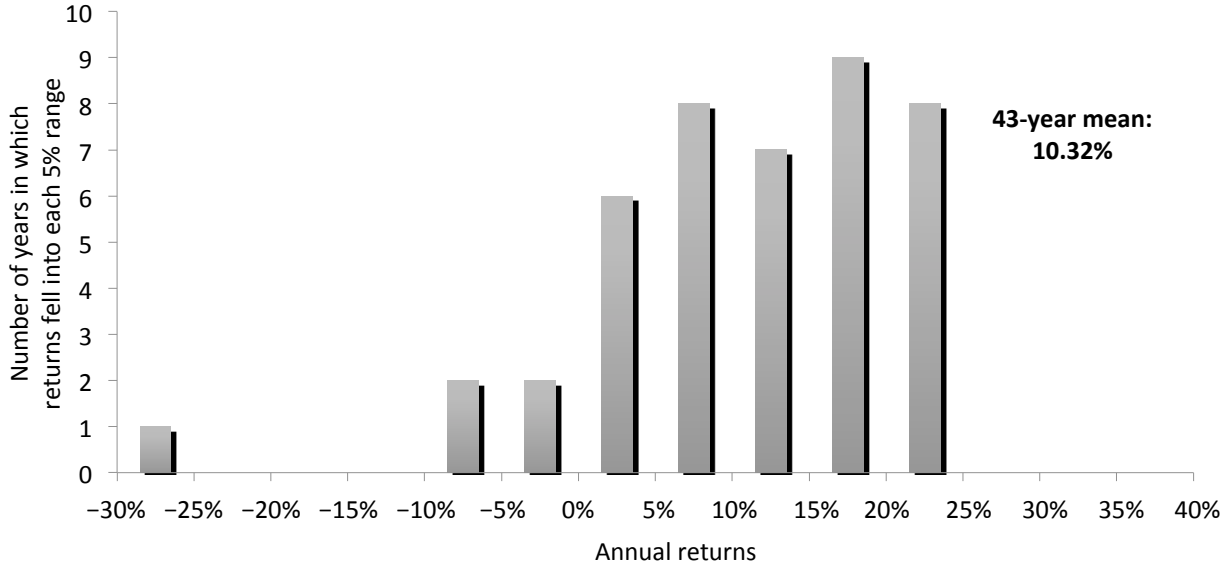
> Year's pension-fund assets = Prior year's assets + Contributions by employees, the state, and other employers + Simulated asset returns – Benefits and other expenses.

Simulating future asset returns requires estimating their distribution. The best data available for estimating future returns are previous returns. The reason that many plans have been discounting their liabilities at 8 percent is that this number approximates the average historical returns.

The US Department of Labor (2008, 2012) has published annual returns on private defined-benefit pension plans between 1985 and 2010. The average annual return during this period was 8.86 percent. I could not obtain long time series of annual returns for public systems in Indiana or Illinois, but was able to obtain 43 years of return history for the Oregon Public Employee Retirement System (2012a, 2012b), which should not be systematically different from those in other states. The Oregon Public Employee Retirement System (PERS) return history is shown in figure 5. The chart takes the form of a histogram with each bar showing the number of

years in which returns fell into a given 5 percent range, e.g., 5 percent to 10 percent or 15 percent to 20 percent. The average return was 10.32 percent, but annual returns were quite variable. The distribution of returns is not bell-shaped, i.e., the annual returns are not concentrated around the mean as they would be in a normal distribution.

Figure 5. Oregon Public Employee Retirement System Annual Returns, 1970–2012



Source: Oregon Public Employee Retirement System (PERS), http://www.oregon.gov/pers/Pages/index.aspx.

Given the fact that many such financial phenomena are not normally distributed, I built PSCF to handle an alternative to the normal distribution. This alternative, known as the Cauchy-Lorentz distribution, allows for fat tails. In other words, random numbers generated according to a Cauchy-Lorentz distribution are not as heavily concentrated around the mean.

Although prior returns provide the best evidence for the distribution of future returns, simply assuming that future returns will be a repeat of the past is insufficient. Theory and other evidence may be employed to increase the plausibility of the forecasted distribution of returns. The main question is whether it is appropriate to assume that future returns will average 8–10

percent, as they have in recent decades. In this regard, there are a couple of persuasive arguments for assuming that future returns will be lower.

First, future GDP growth in the US and other advanced countries should be slower than it was during the last decades of the 20th century, due to population aging. Once people reach their 50s, their consumption and labor-force participation both begin to fall. With children finishing school, the pressure to earn and spend is reduced. While readers may be familiar with exceptions to this characterization, such as people having children later in life, parents supporting nonworking "boomerang kids," or highly acquisitive older adults, these are exceptions rather than the rule—and it is the rule that should be expected to drive future GDP growth. Restrained economic growth resulting from population aging should be expected to limit future equity returns.

Second, the prospects for returns on fixed-income investments appear to be poorer than they have been in the past. The 30 years since 1982 were a period of secular interest-rate decline. When interest rates fall, the value of fixed-income investments rises. By 2012, rates appear to have fallen close to an absolute minimum. With rare exceptions, investors will not accept negative interest rates, nor will they take very low positive rates for long-term bonds—given the time value of money. Consequently, the opportunities to achieve capital gains on bonds appear to have been exhausted. As interest rates rise—which economists generally expect them to do—capital gains on fixed-income investments will give way to losses. Given these considerations, I simulate future pension-fund asset returns as a function of GDP growth with a mean of 7 percent.

In Illinois, future pension costs are fixed amounts taken from the five pension-fund actuarial reports. It would be preferable to add some variability to these estimates, but to do so in a methodologically consistent manner would require access to the five actuarial models used to generate the cost projections. Further, the advantages of adding randomness would be fairly

limited. The main risk factor—aside from a radical increase in longevity—is inflation. However, Illinois tier I retirees receive a 3 percent cost-of-living adjustment regardless of the inflation rate. Tier II retirees (hired after January 1, 2011) receive 3 percent or half the increase in CPI, whichever is lower. Consequently, there is no risk of a cost explosion due to inflation under current law.

For group health insurance, I assume that benefits will continue to grow at a rate of 7 percentage points above the rate of inflation. Because the median inflation rate projected in the simulation model is about 3 percent, I am effectively projecting nominal cost growth of about 10 percent. This estimate may be conservative (i.e., too high) given the factors restraining OPEB growth discussed earlier.

In this analysis, deficits are assumed to immediately result in new bond issuance and surpluses to trigger redemptions. This is an oversimplification of the actual process, but I believe it sufficient for modeling purposes. Over time, deficits do lead to a need for new borrowing, as they have in the case of pension-obligation bonds. These bonds would not need to have been issued if there was slack elsewhere in the budget.

In addition to deficits and surpluses, debt is also assumed to accumulate from capital spending. The governor's budget (Governor's Office of Management and Budget, 2013) contains a schedule of intended debt issuance through 2018. I use this data and assume that issuance grows with gross state product in subsequent years.

XIII. Model Results

If present trends continue, Illinois's budget will become increasingly dominated by health-related expenditures. This trend will accelerate with the implementation of the Affordable Care Act.

In 2012, Illinois's ratio of interest and pension expenses to revenues was 9.8 percent—well below the 30 percent threshold assumed to be the default point. Even under very bad economic conditions, it would take several years for Illinois to reach this default threshold. Consequently, in the near to intermediate term, Illinois's modeled annual default probability would be zero under any plausible budget scenario.

With the assumptions used here, there is no breach of the 30 percent threshold until 2030—when four trials in 1 million exceed this level. The frequency of default cases gradually increases until about 1.7 percent of the trials end in default by 2044. Even this default probability is likely to be an overstatement, because the projection does not assume policy adjustments after 2015. If the state faced a period of extended deficits, further policy change would be likely before insolvency occurred.

Indiana performs even better than Illinois in the simulation analysis. Its ratio of maximum interest plus pension to revenue never approaches the 30 percent threshold. I conclude that the state has no measurable default risk.

Illinois's low risk of default estimated by the simulation may come as a surprise to those who have heard the drumbeat of bad news about the Prairie State's finances. It should be remembered, however, that Illinois's headline fiscal problems are the result of an annual struggle to balance general-fund revenues and expenditures. The balanced-budget requirement has hindered the accumulation of debt in Illinois and most other states.[6] This is a sharp contrast to the federal government, which has no structural check on deficit spending.

[6] State balanced-budget requirements vary in terms of their stringency. The National Association of State Budget Officers (2008) reports that Illinois is one of 37 states that requires the governor to sign a balanced budget and one of 43 states that do not allow deficit carryovers from prior years—suggesting that the Illinois requirement is stricter than those in some other states. On the other hand, the state constitution permits the legislature to authorize bonds by a three-fifths majority and to include bond proceeds as revenues in the balanced-budget calculation.

It is worth comparing Illinois to a couple of subsovereign bond issuers that do not have balanced-budget requirements: Ontario and Puerto Rico. Ontario, Canada's largest province, makes a particularly interesting comparison, because its population and economic output are similar to those of Illinois. Puerto Rico is also a useful benchmark because it operates under many of the same laws as US states.

Table 4. Comparison of Illinois to Ontario and Puerto Rico, 2011

	Illinois	Ontario	Puerto Rico
Population	12,869,257	13,203,479	3,714,000
GDP or GSP	568.8	612.5	64.1
Bonded debt	32.8	236.6	31.8
Interest expense	1.5	9.5	1.8
Total revenue	64.0	106.7	15.5
Debt per capita	2,549	17,920	8,567
Debt/GDP	5.77%	38.63%	49.63%
Interest/revenue	2.39%	8.89%	11.69%

Note: Ontario amounts are in Canadian dollars, which traded virtually at par with the US dollar in 2011.
Sources: Illinois and Puerto Rico 2011 comprehensive annual financial reports; Ontario public accounts, 2011.

As table 4 shows, Illinois's debt on a per capita basis or as a percentage of gross product is dwarfed by that of the other two entities. Because Puerto Rico has a number of tax-supported, debt-issuing special entities not included in its primary government's annual financial reporting, the numbers shown above understate its total tax-supported debt. Karsten and Nguyen (2012) provide various estimates of that commonwealth's debt, ranging up to 105 percent of GDP. They also report that Puerto Rico's pension plans have funded ratios of 7 percent to 21 percent—significantly worse than Illinois's. Finally, it is worth noting that Puerto Rico, like Illinois, lacks the power to issue its own currency, so its ability to service such a large debt burden is testimony to both the low level of interest rates and the revenue capacity of US subsovereign entities.

Finally, the model results offer some other insights into the future of Illinois's budget. Assuming rapid health inflation continues and the Affordable Care Act is implemented as planned, health expenditures will occupy a growing portion of the state's budget.[7] Currently, health accounts for about 15 percent of consolidated revenues. The mean of the forecast distribution shows this share growing to 28 percent by 2044. While part of this growth will be offset by federal revenues, room will need to be found elsewhere in the budget to accommodate the state's share of this growing obligation.

XIV. Conclusion

Illinois bonds are evidently much riskier than Indiana debt, but neither appear to have substantial risk—at least not in the near or intermediate term. The idea that one thing can be proportionately much more risky than another, yet not very risky in absolute terms, may seem like a paradox, but it is not.

A simple analogy from outside the world of finance can drive this point home. According to statistics compiled by Stephens (2011), the odds of dying in a car trip are one in a million, while the odds of dying in a commercial airplane trip are one in 72 million. Although commercial aviation is much safer than driving, almost no one chooses to take a plane rather than a car due to safety concerns. While most people don't know the exact odds, both risks are so remote that the proportional difference need not be reckoned into anyone's plans.

Much the same is the case when choosing among state bonds. Thus, Illinois has made much worse fiscal-policy decisions than Indiana, and its bonds are riskier as a result—but they are still not very risky at all in absolute terms.

[7] Data are available in the Excel workbook at http://www.publicsectorcredit.org/illinois_v2.xlsm.

Despite its poor fiscal policies, Illinois has not yet accumulated a dangerous level of debt relative to the size of its economy. Nor has it taken on pension burdens that exceed the state's ability to raise revenue. Because the state workforce represents a relatively small proportion of the population, the Illinois tax base is more than equal to the task of shouldering the burden of state-retiree pensions.

In general, US states are much safer than corporations and should enjoy higher credit ratings than most private debt issuers. Illinois last defaulted in 1842, and it cured its insolvency in 1857. It has been either debt free or a timely payer for 155 years. Few corporations can claim such a long record of good credit. Even the best-managed companies face the risk that their offerings will lose popularity or become obsolete. If this happens, their revenue and debt-servicing capacity can quickly decline. A government presiding over a large, diversified economy does not face such a problem. Through taxation, it extracts economic rents from citizens and businesses that choose to remain within its borders. Criticism of its tax and regulatory policies aside, the fact is that Illinois is and will likely remain a desirable place by world standards. Situated in the middle of North America, it offers peace, economic stability, infrastructure, and leisure options not equaled in most of the world. It is reasonable to expect that Illinois will continue to be home to a large number of high-income taxpayers and profitable companies. The state will thus continue to generate substantial and growing tax revenues more than sufficient to service its moderate debt burden.

Those concerned with the cost of government should welcome the finding that Illinois does not face a solvency crisis. If this conclusion is embraced by investors, Illinois's interest rates will be bid down, allowing the state to roll over its debt at lower coupon levels. The result would be reduced debt-service expenditures and thus a lower burden for taxpayers over the long term.

Finally, a conclusion that Illinois's fiscal policies do not represent a material threat to the state's solvency should not be interpreted as a statement of support for these policies. To do so would confuse a positive finding with a normative predisposition.

Fiscal policies that shift costs onto future generations are morally dubious in any case, but especially so in the current context. Today, policy is being set primarily by the large and very fortunate baby-boom generation. The baby boomers—of which I am one—have enjoyed some of the highest living standards in world history and witnessed remarkable progress during their lifetimes. Indications are that the smaller cohorts that are following us will be less fortunate. It is these future taxpayers and service recipients who will be the victims of today's fiscal policies. Yes, they can shoulder the burden, but forcing this yoke upon them is a great act of unfairness.

The view that all government services and transfer payments should be borne by today's taxpayers is a normative principle. As Indiana found for 74 years after the 1921 implementation of its pay-as-you-go teacher-retirement plan, long-term underfunding did not cause the sky to fall. While it is true that shifting too many costs onto future generations is a recipe for default, Illinois has yet to engage in a level of intergenerational burden shifting that would pose a serious threat to bondholders.

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