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THE TROUBLE WITH SWAPS: AN INVESTIGATION OF MUNICIPAL INTEREST RATE SWAP USE IN PENNSYLVANIA

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ABSTRACT

In 2003, the Pennsylvania state government passed Act 23, which allowed for the explicit legalization of municipal interest rate swaps. Interest rate swaps are a form of financial derivative that involve an exchange of payments based on the movement of market interest rates. Potential benefits of swaps include expanded financing options and reduced borrowing costs.

Few local government officials have the financial background necessary to understand the complexities of these swaps. Still, hundreds of school boards and local authorities across the state of Pennsylvania have accepted offers from investment banks to enter into interest rate swaps. Sometimes these swaps involve a substantial upfront payment to the government unit in exchange for agreeing to the deal (e.g., the swaption discussed in Chapter 4). Officials are attracted by the promises of immediate debt savings but ignore the significant threats of interest rate risk and credit risk. In addition, because municipal swaps are not formally regulated, they can involve hidden fees and collusion between investment banks and financial advisory firms.

Municipal interest rate swaps have become a divisive political issue for Pennsylvania leaders. Some argue that the swaps are a dangerous use of public funds and that the government should enact a statewide ban. Others point to the economic benefits of swaps and claim that nothing should be done. Perhaps the more appropriate response lies somewhere between these two extremes. Increased state oversight and stricter transparency requirements are a few of the ways that might limit municipal swap use to only those governments that have the appropriate degree of financial sophistication.

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Chapter 1

Introduction

The financial choices that our local governments make affect us all. From the amount of taxes we pay to the quality of our schools, local government decisions play a large, but often overlooked role in our society. Unfortunately, many local officials who are charged with making judgments about complicated financial matters do not have the necessary expertise to do so. Interest rate swaps have become a prime example of this issue. In recent years, interest rate swaps have become a popular method for school districts and local governments to avoid interest rate risk. The central aim of this thesis is to determine the economic consequences of these municipal swaps in the state of Pennsylvania, and suggest responses to the problems they can cause. The paper will also shed new light on how the state can respond to the risks and rewards that the swaps present to local communities.

The thesis is divided into several chapters. First is an introduction to commodity swaps and interest rate swaps. This section will be especially useful for readers who are unfamiliar with financial derivatives. Following this introduction is an explanation of Pennsylvania law concerning municipal swap use. Legislation has changed throughout time, and interest rate swaps have recently become of great interest to politicians across the state. Next is the largest section of the report: several case studies that show how interest rate swap use can lead and has led to unintended effects in local communities. These case studies are then evaluated to answer the question, “What are the consequences of these interest rate swaps to the people and the economy of Pennsylvania?” Afterward, the thesis offers several potential responses for the Pennsylvania government to make in regard to these swaps and details their probable effects.

Chapter 2

Background on Swaps

Before delving into the controversy over municipal interest rate swap use, it may be useful to provide some background on the basics of swaps. Firms around the world make use of swaps to hedge risky payment streams. According to Robert L. McDonald in his text *Derivatives Markets*, a swap is "a contract calling for an exchange of payments over time" (page 247). The payments in the swap depend on the performance of an underlying asset at specified points in the contract's life. The payments typically involve an exchange of a fixed price with a floating (variable) price. In this section of the thesis, we will first study basic commodity swaps and then move on to interest rate swaps, the central subject of this report.

Section 1: Commodity Swaps

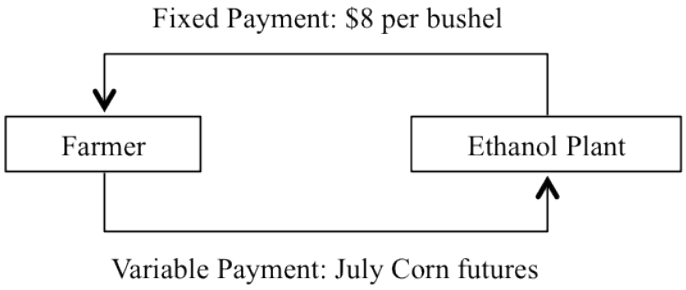
To begin, we will examine a simple commodity swap. In a white paper entitled "An Introduction to Grain Calendar and Basis Swaps," the Chicago Mercantile Exchange provides a useful example that can be adapted for our purposes. This example demonstrates the value of entering into a swap for two counterparties looking to reduce the risk of future payment streams. Suppose that there is a farmer who is hoping to manage the risk he faces in selling his corn crop at future dates at an unknown price. This price may or may not be profitable for the farmer. Meanwhile, an ethanol plant is hoping to manage the risk it faces in purchasing corn. The future prices it will pay may or may not be too expensive. By entering into a commodity swap with each other, both parties can achieve their goals (by avoiding the risk noted). Say that the swap begins on January 1, and the first exchange of payments will occur on June 30. On January 1, the ethanol plant agrees that it will pay the farmer a fixed price of $8 per bushel on June 30. The farmer will

provide the corn on June 30 for that $8 price. If no swap had occurred, the farmer would provide the corn at the June 30 price of Corn.

On June 30, suppose that the actual settlement price of the July Corn futures is $9 per bushel. If no swap had occurred, the farmer would have been able to sell the corn at this higher price. Since the swap did occur, however, this settlement price will benefit the ethanol plant. The ethanol plant will pay the farmer $8 per bushel, as promised in the original terms of the swap agreement. In effect, the farmer pays the difference, or $1 ($9 - $8) per bushel.

Note that this swap serves merely as a hedge against the risk associated with the physical transaction being expensive. The actual transaction can be just a financial settlement, without the actual purchase of the corn. The payments from such a swap are depicted in Figure 2-1 below.

Figure 2-1: Simple commodities swap between a corn farmer and an ethanol plant



Adapted from an example originally appearing in "An Introduction to Grain Calendar and Basis Swaps," a white paper from the Chicago Mercantile Exchange.

If the swap is settled with just a cash transaction, the farmer still needs to actually sell his corn in the market. He will be able to do so at a price of $9 per bushel, the July Corn futures price. Because he had to pay $1 to the ethanol plant in the swap, however, it is as though he were selling his corn at an $8 price. Meanwhile, when the ethanol plant buys corn in the market, it will do so at the July Corn futures price of $9 per bushel. Remember, of course, that the ethanol plant received $1 per bushel as a result of the swap. The swap allows both parties to lock in an $8 price for corn; the farmer will sell his corn for $8 per bushel and the ethanol plant will purchase it for

$8 per bushel. Tables 2-1 and 2-2 show that this result will occur no matter what the July Corn futures settlement price turns out to be. The ethanol plant will benefit if the settlement price is greater than $8 (as in the example above, which is represented in Table 2-1), and the farmer will benefit if the price is lower than $8 (represented in Table 2-2).

Table 2-1: Result of commodity swap when variable price exceeds fixed price

Cash price: $9 per bushel	Farmer	Ethanol Plant
Swap Payment Received	$8.00	$9.00
Swap Payment Paid	-9.00	-8.00
Swap Gain/Loss (+/-)	-$1.00	$1.00
Net Price Received/Paid (+/-)	Cash price: $9.00 -1.00 $8.00	Cash price: -$9.00 +1.00 -$8.00

In the figure above, the cash price of corn on the swap settlement date is $9 per bushel, $1 more than the $8 fixed price that the ethanol plant agreed to pay to the farmer. The result is a $1 loss for the farmer and a $1 gain to the ethanol plant. The net effect is that the farmer sells his corn for $8 and the plant purchases its corn for $8, $1 less than the going market price.

Table 2-2: Result of commodity swap when fixed price exceeds variable price

Cash price: $6 per bushel	Farmer	Ethanol Plant
Swap Payment Received	$8.00	$6.00
Swap Payment Paid	-6.00	-8.00
Swap Gain/Loss (+/-)	$2.00	-$2.00
Net Price Received/Paid (+/-)	Cash price: $6.00 +2.00 $8.00	Cash price: -$6.00 -2.00 -$8.00

In the figure above, the cash price of corn on the swap settlement date is $6 per bushel, $2 less than the $8 fixed price that the ethanol plant agreed to pay to the farmer. The result is a $2 gain for the farmer and a $2 loss to the ethanol plant. As in the example above, the net effect is that the farmer sells his corn for $8 and the plant purchases its corn for $8. This time, however, it is the farmer who benefits and not the ethanol plant.

As we can see from this example, entering into a swap is a gamble based on how an individual or firm predicts market prices will change in the future. It would make sense for the farmer to enter into this swap if he believed the market price for corn would decrease in the future. That way, he would be guaranteed to receive a relatively high price, $8 per bushel, for his corn. Meanwhile, the ethanol plant should consider entering into the swap if it had reason to believe the market price for corn would increase in the future. Doing so would guarantee a relatively cheap purchase price, $8 per bushel. There is no question that the net price will be $8 per bushel. This certainty aids both the farmer and the ethanol plant when it comes to their financial planning. Whether that $8 will be considered high or low, however, depends on the external market price upon the settlement of the swap ("An Introduction to Grain and Basis Swaps").

Section 2: Interest Rate Swaps

Now that we have examined a basic swap example, let's now focus our attention on interest rate swaps, the major subject of this thesis. Firms use interest rate swaps to manage their interest rate risk. McDonald describes an interest rate swap as "equivalent to borrowing at a floating rate to buy a fixed-rate bond" (page 256). Earlier, we discussed that the payments in a swap depend on the performance of an underlying asset. In the commodity swap example, the underlying asset was the market price of corn. The counterparties in the swap were protecting themselves from a negative movement in that market price in relation to a fixed $8 amount. In an interest rate swap, however, the underlying asset is, well, an interest rate. Often that interest rate is based on LIBOR (the London Interbank Offered Rate), the average rate that major London banks would be charged if they borrowed from other banks. The purchasers of an interest rate swap are protecting themselves from potentially increased interest rate charges by essentially turning their variable rate loan into a fixed rate loan (just as home buyers prefer fixed rate

mortgages over Adjustable Rate Mortgages (ARMs) so that they can plan on fixed mortgage payments, not payments that increase without limit). Often, schools find that the only way to obtain a fixed-rate loan is to use a swap to convert a variable-rate loan.

This time, our example is adapted from a 2013 Society of Actuaries report by Paul G. Ferrera and Seyed A. Nezzamoddini. Suppose that Company A currently has $100 million of debt on which it is paying interest at a variable rate of LIBOR + 1%. Meanwhile, Company B has $100 million of debt on which it is paying interest at a fixed rate of 10%. Therefore, Company A is borrowing at a variable rate and Company B is borrowing at a fixed rate. Suppose that Company A would prefer to borrow at a fixed rate and Company B would prefer to borrow at a variable rate. By entering into an interest rate swap with each other, both companies can achieve their goals. For example, a swap could require Company A to pay a fixed 8% rate to Company B in exchange for payments at a variable LIBOR rate from Company B. The 8% is set by the market and will be different at different times. We will show how it is determined in the next section of this chapter. As a result, Company A will effectively be borrowing at a fixed 9% rate (LIBOR + 1% + 8% – LIBOR). Company B will effectively be borrowing at a variable LIBOR + 2% rate (10% + LIBOR – 8%). Table 2-3 below presents these calculations for ease of comprehension. This example shows how borrowers at different risk levels can enter into a mutually beneficial interest rate swap based on their comparative economic advantages.

Table 2-3: Plain vanilla interest rate swap example

Interest Rate Swap	Company A	Company B
Original Borrowing Rate	LIBOR + 1%	10%
Swap Payment Paid	8%	LIBOR
Swap Payment Received	- LIBOR	- 8%
Effective Borrowing Rate	9%	LIBOR + 2%

Although this example may seem different than the commodity swap example discussed earlier, both contain the same essential elements. This time, the underlying asset is not the market price for corn but instead the variable LIBOR rate, which represents an average market interest rate. Company B will be borrowing at a variable LIBOR + 2% rate upon settlement of the swap. If LIBOR equals 8% at that time, Company B will be borrowing at a 10% rate, the same rate at which it was borrowing before the swap. Company B would benefit if LIBOR turned out to be less than 8% (in which case they will be making payments to Company A) and would be hurt if LIBOR turned out to be greater than 8%. Company A, meanwhile, will be borrowing at a 9% rate no matter what LIBOR turns out to be upon settlement of the swap. That does not mean, however, that Company A is not affected by changing market interest rates. If LIBOR turns out to be less than 8%, they will be paying Company B 8% - LIBOR. Had Company A not decided to enter the swap, it would have been able to borrow at a lower LIBOR rate and not have to pay Company B anything. On the other hand, if LIBOR turns out to be greater than 8%, Company A will get LIBOR - 8% from Company B and will have profited by entering the swap. The net result is that Company A will be borrowing at a (relatively) low 9% fixed rate (Ferrera and Nezzamoddini).

Thus, a movement in market rates can make the counterparties look good or bad to outside observers, depending on which way rates move. Firms that enter a swap to borrow at a fixed rate, like Company A, will look good if interest rates increase but not if rates decrease. Meanwhile, firms that enter a swap to borrow at a floating rate, like Company B, benefit if rates decrease but not if rates increase.

Section 3: Why Choose a Swap?

The decision to enter into an interest rate swap involves both potential risks and potential rewards. In *Derivatives Markets*, McDonald explains that parties in a swap encounter both interest rate risk and credit risk (262). As we observed in the examples above, a disadvantageous

interest rate movement can increase costs. Besides this interest rate risk, credit risk and termination risk must also be considered. Credit risk, also known as default risk or counterparty risk, is the possibility that the other party engaged in the swap will be unable to fulfill its obligations. Termination risk, meanwhile, is the risk that a swap may end before its planned expiration date. In many of the case studies in Chapter 4, we will see the fixed-rate payer in the swap decide to terminate the contract because of declining interest rates. Upon early termination under these circumstances, the fixed-rate payer is required to make termination payments to the counterparty in the swap. As Douglas Skarr from the California Debt and Investment Advisory Commission explains, these payments are based on "the economic value of the difference between current rates and the contracted swap rate for the remaining life of the swap." These payments compensate the counterparty for losing the fixed-rate payments that it can no longer obtain in the current market (Skarr).

Despite these risks, engaging in an interest rate swap can be economically justifiable. The primary reason to enter into a swap is for entities to get a fixed interest rate when they can only get an unwanted variable rate from a bank. Swaps also allow for interest rate speculation. Entering a swap based on a strong belief that market rates will rise or fall contrary to current expectations can lead to substantial profit, if the speculator is found to be correct by the end of the swap (or the sale of the swap). In his article, "Demystifying Financial Derivatives: Interest Rate Swaps and Municipal Derivatives," Dr. Massimiliano De Santis outlines several other key benefits of interest rate swap use. Interest rate swaps can be used to manage interest rate exposure or to address mismatches between assets and liabilities on the balance sheet. A simpler, and perhaps more important benefit, is that swaps increase the number of financing options available to borrowers. Say that a firm would like a long-term fixed rate loan. Of course, the firm could choose to borrow directly in the fixed rate bond market. Alternatively, it could obtain a variable-rate loan from a bank, and then use an interest rate swap to exchange the variable rate for a fixed

rate. Such a swap may result in a lower-fixed rate than the one the firm could get in the bond market.

De Santis includes an example, which we will adapt here, that explains how this lower cost of borrowing can be possible. Suppose Company R, a risky borrower, has a relatively high chance of defaulting on its loans. Company S, meanwhile, is considered to be more stable. Both companies are hoping to acquire a loan that will help them finance a new investment and have two options: borrow from a bank at a short-term variable rate, or issue bonds at a long-term fixed rate. Company R will have a tough time issuing long-term bonds because investors know that the company has a high chance of defaulting on its obligations. Company R learns that it can borrow from the bank at LIBOR + 2% or issue bonds at a fixed rate of 11%. Company S can borrow at LIBOR + 1% from the bank, or 7% from issuing bonds. Company S can borrow at lower rates in both markets, but especially so in the long-term bond market. Because there is a 4% difference between the companies' rates in the bond market and only a 1% difference in the bank loan market, Company S is said to have a comparative advantage in the bond market and Company R is said to have a comparative advantage in the bank loan market (De Santis). Table 2-4 on the next page summarizes this data.

Let's say that Company R would prefer to borrow at a fixed rate and Company S would prefer to borrow at a floating rate. Without entering into a swap, Company R will have to borrow at 11% (in the bond market) and Company S will have to borrow at LIBOR + 1% (in the bank loan market). To reduce these rates, they can borrow from the market in which they have a competitive advantage, and then swap payments with each other. With this method, Company R will borrow at LIBOR + 2% in the bank loan market, and Company S will borrow at 7% in the

Table 2-4: Comparative advantages for borrowing in short-term and long-term markets

	Bank Loan Short-Term Variable Rate	Bond Issue Long-Term Fixed Rate
Company R	LIBOR + 2%	11%
Company S	LIBOR + 1%	7%
Difference	1%	4%
Comparative Advantage	Company R	Company S

This example was adapted from a report for NERA Economic Consulting by Dr. Massimiliano De Santis.

bond market. In the swap, Company R will borrow at a fixed 9% rate from Company S, and Company S will borrow at a variable LIBOR + 2% rate from Company R. The net effect is that Company R is borrowing at a fixed 9% rate and Company S is borrowing at a variable LIBOR rate. By entering into the swap, both parties are able to achieve lower borrowing rates than would have been possible without the swap (De Santis). These results are summarized in Table 2-5:

Table 2-5: Lower borrowing costs resulting from an interest rate swap

	Company R (Risky)	Company S (Secure)
Goal	Borrow at a fixed rate	Borrow at a variable rate
Without swap	11%	LIBOR + 2%
Comparative advantage	Borrow at a variable rate	Borrow at a fixed rate
Before swap	LIBOR + 2%	7%
Swap rate paid	9%	LIBOR + 2%
Swap rate received	- (LIBOR + 2%)	- 9%
With swap	9%	LIBOR

This example was adapted from a report for NERA Economic Consulting by Dr. Massimiliano De Santis.

This example demonstrates that interest rate swaps can expand a firm's set of financing options. Here, the swap is mutually beneficial for both counterparties. Both end up borrowing at a 2% lower rate than they would have without the swap. Of course, Company S is now exposing itself to some of Company R's credit risk. Despite the many risks associated with interest rate swaps, they do have their place in a firm's financial toolbox. If used properly, swaps can serve as a great help toward managing interest rate risk exposure and reducing borrowing costs.

Section 4: Determining the Swap Rate

In the last two sections, we explored swaps in which payments made at a variable rate were exchanged for payments made at a fixed rate. We now focus our attention on the calculation of this fixed swap rate, using McDonald's *Derivatives Markets* text.

For financial planning purposes, a borrower may wish to guarantee his or her borrowing rate rather than face an unpredictable variable rate that fluctuates with market conditions. Suppose we have an individual who would like to purchase a 3-year loan. By using forward rate agreements, the borrower could lock in a series of borrowing rates that increase over time (just like a yield curve). Alternatively, the borrower could use a swap to borrow at a fixed rate over time. This fixed rate will fall somewhere in the middle of the increasing forward rates. In a swap transaction, the expected present value of the swap payments made by the fixed-rate payer should equal the expected present value of the payments made by the variable-rate payer. This equivalence is what makes a swap contract a fair deal for both parties at its inception. The formula below shows an intuitive calculation of R, the fixed rate in a swap transaction. The components in the formula are as follows:

- R = the fixed-rate computed in the swap transaction
- $P(0, t_i)$ = the price of a zero-coupon bond maturing on date t_i

- $r(t_{i-1}, t_i)$ = the expected return at time 0 to be earned from date t_{i-1} to date t_i (also known as the implied forward interest rates)

$$R^* \sum_{i=1}^{n} P(0, t_i) = \sum_{i=1}^{n} P(0, t_i)^* r(t_{i-1}, t_i)$$

On the left side of the equation, we have the fixed-rate R, multiplied by a summation that represents the present value of a $1 annuity with interest rates that vary over time. On the right side, we have a summation that represents the present value of interest payments based on the implied forward rates. If we rearrange this formula, we obtain the following:

$$R = \sum_{i=1}^{n} \left[\frac{P(0, t_i)}{\sum_{j=1}^{n} P(0, t_j)} \right] r(t_{i-1}, t_i)$$

By studying this new formula, we can observe that R is merely the weighted average of the implied forward interest rates. The forward interest rates are weighted by the zero-coupon bond prices. Let's apply this formula to an example taken from the *Derivatives Markets* text. McDonald provides data about zero coupon bond prices and implied forward interest rates that we present in Table 2-6 below:

Table 2-6: Sample zero-coupon bond prices and forward rates used to calculate R

Years to Maturity (i)	Zero-Coupon Bond Yield	Present Value of i-year Zero Coupon Bond: $P(0, t_i)$	One-Year Implied Forward Rate: $r(t_{i-1}, t_i)$
1	.060	$1/1.060 = 0.9434$	.0600
2	.065	$1/1.065^2 = 0.8817$	$1.065^2/1.0600 - 1 = 0.0700$
3	.070	$1/1.070^3 = 0.8163$	$1.070^3/(1.0600*1.0700) - 1 = 0.0801$

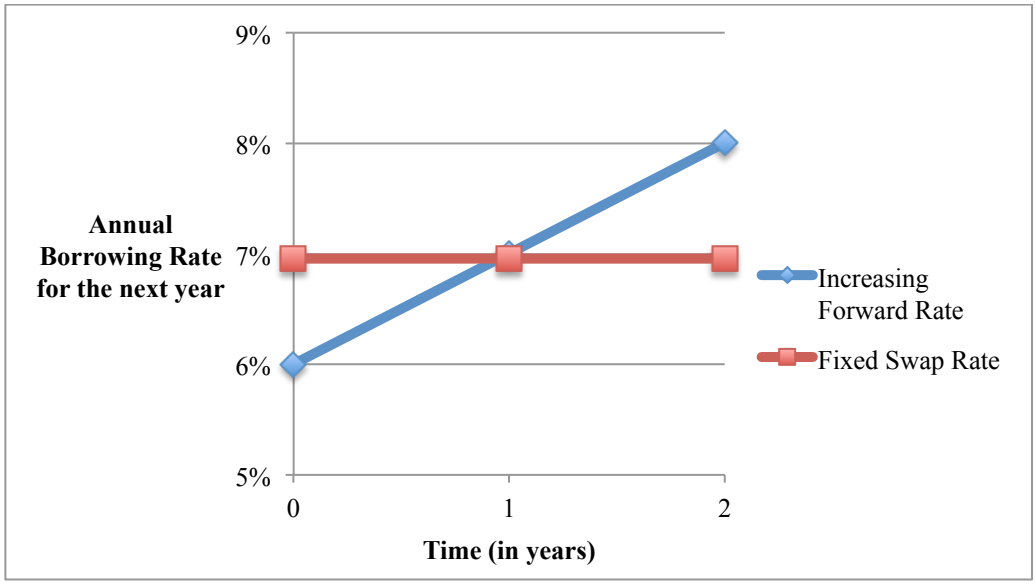
Using the second formula on the previous page, we can calculate R as follows:

$$R = \frac{0.9434}{0.9434+0.8817+0.8163} * 0.0600 + \frac{0.8817}{0.9434+0.8817+0.8163} * 0.0700 + \frac{0.8163}{0.9434+0.8817+0.8163} * 0.0801$$

$$R = 6.9548\%$$

Ultimately, the borrower hoping to lock in rates for a three-year loan has two options. The individual could go to a bank that will use forward rate agreements to lock in a 6.00000% rate for the first year of the loan, a 7.00236% rate for the second year, and an 8.00705% rate for the third year. Alternatively, the individual could use a swap to guarantee a fixed 6.9548% annual rate for the three years of the loan. Below is a graph comparing the year-by-year borrowing rates involved in these two options:

Figure 2-2: Borrowing using forward-rate agreements versus borrowing at a fixed swap rate



From this graph, we see that the fixed swap rate is indeed a weighted average of the three forward rate components. We also observe that, because of the increasing nature of the variable forward rate, the fixed swap rate will initially be higher than the forward rate. As a result, the fixed-rate payer will make large payments in the early years of a swap (McDonald, pages 206, 257).

Chapter 3

Pennsylvania Law and Municipal Swap Use

Now that we've reviewed the basics of interest rate swaps, we are ready to discuss how Pennsylvania municipalities have put them to use. Legislation of municipal swaps has changed over time, and the issue is now a major point of contention among state politicians. According to Braun and Selway from *Bloomberg*, local government units traditionally made use of primarily low-risk financing strategies, such as issuing fixed-rate bonds. The idea was to avoid placing taxpayer money at substantial risk (Braun and Selway). The primary reason that schools became interested in swaps has to do with their desire for fixed-rate borrowing options. For budgetary reasons, schools prefer predictable fixed-rate loans rather than variable-rate loans. It can be very difficult, however, to purchase large fixed-rate loans. Interest rate swaps allow schools to essentially turn their variable-rate loans into fixed-rate loans.

In 2003, financial advisory firms lobbied the Pennsylvania state government to pass Act 23, which allowed for the explicit legalization of municipal swaps. Ever since, governments have been regularly entering into these swaps, often with little understanding of the risks of the arrangements. Many of these swaps involved switching floating-rate debt tied to market rates, such as LIBOR, for fixed-rate debt. When interest rates fell due to the Federal Reserve's stimulus in response to the financial crisis of 2008, many of these government units faced extraordinary losses (because they had to pay the swap counterparty their fixed rate minus the lower LIBOR rates). In reaction to these losses, the Pennsylvania Department of the Auditor General launched a large-scale investigation into municipal swap use across the state. According to the investigation's 2009 report, 107 school districts and 86 other local government units entered into at least one interest rate swap between 2003 and 2009 (Pennsylvania).

Since that time, however, no real legislative change has occurred. According to Tim Darragh and Steve Esack from *The Morning Call*, two bills were proposed in 2009 that might have prevented future problems with municipal swaps. The first, the Over-the-Counter Derivatives Markets Act of 2009, planned to place swaps and other derivatives under the regulation of the Securities and Exchange Commission and the Commodity Futures Trading Commission. Doing so would prevent derivatives from being marketed to financially inexperienced entities, like some schools and local governments. Another bill, the Investor Protection Act of 2009, would have mandated that financial advisers to municipalities be truthful and transparent with their clients (Esack and Darragh). If they had passed, these acts could have gone a long way in protecting the interests of local communities. Unfortunately, neither of these bills was enacted.

In the absence of any significant legislation, Jack Wagner, former Auditor General (and potential 2014 gubernatorial candidate), has been campaigning for a ban of municipal swap use. In addition, Romy Varghese from *Bloomberg* reports that Republican State Senator Mike Folmer introduced a bill in February 2013 that would prohibit any publicly funded government units from using derivatives (Varghese). In September 2013, the matter was discussed before the Senate's Local Government Committee. Kate Giammarise from the *Pittsburgh Post-Gazette* reported that Wagner repeated his call for a ban of municipal swaps. Wagner referred to swaps as "nothing more than gambling with public funds." He pointed out that, in addition to school boards, more sophisticated government units like the Delaware River Port Authority and the Pennsylvania Turnpike Commission have suffered losses because of the swaps. Nancy Winkler, treasurer for the city of Philadelphia, disagreed with the idea of banning swaps. Although she admitted that the transactions include an element of risk, she stated that the Philadelphia city government "brings the appropriate degree of sophistication and prudence" to swap use. Without access to interest

rate swaps, Winkler said Philadelphia would fall behind other major cities when it comes to financial planning (Giammarise).

In opposition to Winkler's assessment, however, is a 2012 report from the Pennsylvania Budget and Policy Center. In the report entitled "Too Big to Trust? Banks, Schools, and the Ongoing Problem of Interest Rate Swaps," Sharon Ward points to research showing that the Philadelphia city and school district have lost $331 million in net interest and termination payments, and that there is a potential for $240 million more in losses if interest rates remain low (Ward). It is important to note that these losses do not necessarily mean that entering the swap was the wrong decision at the time it was entered. The Philadelphia case will be explored further in Chapter 4.

Ultimately, much debate exists across Pennsylvania over the value of interest rate swaps. Some politicians, like Jack Wagner, seem to think that the state would be better off if municipal swaps were banned entirely. Others, like Nancy Winkler, argue that swaps have inherent benefits like expanding a municipality's set of financing options, including allowing for fixed rate loans and lowering borrowing costs.

Chapter 4

Case Studies

In this chapter, we will examine six case studies to explore how interest rate swap use has affected municipalities across Pennsylvania. Our first four case studies will take us to the local public school districts in State College, Erie, Bethlehem, and Parkland. Our final two studies will observe interest rate swaps undertaken by the Delaware River Port Authority as well as the city government (including the school district) of Philadelphia.

Section 1: State College Area School District

The State College Area School District found itself in some very hot water after its decision to enter into an interest rate swap in 2004. An official statement from the school's board of directors in January 2013 provides details from the case. In 2004, the school board received permission from the state's Department of Community and Economic Development to issue $58 million in floating rate bonds. The school was planning some large-scale renovations to its high school buildings. Two years later, the board decided to enter a swap contract with the Royal Bank of Canada (RBC) to exchange their floating rate debt with fixed rate debt. The swap payments were set to begin in December 2007. The school would make semiannual payments at a fixed 3.884% rate to RBC for 20 years. In exchange, RBC would make monthly variable payments tied to the current LIBOR rate to the school district. School board members believed that the fixed payments would be preferable to the variable payments (State College Area School District). Of course, as we reviewed in Chapter 2, the fixed rate borrower in a swap is by no means free of interest rate risk. If market rates increased, the school would benefit, but if they decreased, the school's payments to RBC would exceed RBC's payments to the school.

Ultimately, the loan didn't happen. In May 2007, the school decided to cancel the high school renovation project and abandoned plans to issue the floating rate bonds. As a result, there was no longer any need to exchange floating rate debt for fixed rate debt. If it weren't for the high cost of termination payments (several hundred thousand dollars), the school likely would have canceled the swap at that point. The school decided to wait it out, hoping that market rates would increase and place the district in a better financial position in the swap deal. Unfortunately, rates tumbled in 2007 and payments to end the swap rose to three million dollars by December. The swap payments should have started that month, but the school voted to postpone the payments for another three years. If market rates rose, perhaps the school's position would improve (State College Area School District).

Rates continued to fall, and by 2010, the school district faced over $10 million in termination payments. The board decided to seek legal action against RBC, hoping that the court would find the terms of the swap unenforceable under Pennsylvania law. After all, the renovation project had been canceled, the floating rate bonds had never been issued, and the swap payments had yet to begin. While a United States District Court began to examine the case, the swap payments started, and the school district failed to make a payment in May 2011. The Royal Bank of Canada began its own lawsuit in order to collect the hefty termination payments (State College Area School District).

Ultimately, the courts determined that the 2006 swap agreement was valid. Rather than continue the litigation, the State College Area School District managed to negotiate a settlement with RBC. In return for $9 million from the school board paid over five years, the bank would cancel the swap (State College Area School District).

By negotiating this deal, the school was able to escape the swap and reduce its debt to the Royal Bank of Canada. The $9 million settlement, however, can hardly be considered a happy ending to this story. After all, the school canceled its renovation plans back in 2007. Nine million

dollars of local taxpayer money had been wasted. The money, time, and consternation wrought by the swap did nothing to improve public education.

In the school board's statement, the directors mentioned the Pennsylvania Auditor General's 2009 report discussed in Chapter 3 of this thesis. The directors support legislation to forbid the postponement of forward swaps or to "ban school districts from using swaps and other derivatives altogether" (State College Area School District).

Section 2: Erie City School District

The Erie City School District serves as another example of municipal interest rate swaps gone wrong. Like the State College case, this example demonstrates the interest rate risk associated with the swaps. The Erie case, however, also points to problems associated with misinformation and lack of transparency.

According to a Bloomberg report from Martin Z. Braun and William Selway, the Erie City School District found itself in a dire financial situation. There was little room in the budget for purchasing textbooks, let alone maintaining buildings. In September 2003, JP Morgan Chase banker David DiCarlo made Erie superintendent James Barker an offer that he couldn't refuse. If the district would agree to enter a swap with the bank in the future, from 2011 to 2029, the bank would pay the school $750,000 upfront. The swap was actually a swaption, or an option to exercise a swap. Under the terms of the contract, the bank, but not the school, would decide whether or not to exercise the swap based on prevailing market rates (Braun and Selway).

For a school facing serious budgeting problems, receiving $750,000 seemed like a no-brainer. The board did not seriously consider the risks associated with the swap. As board member Penelope Kingman recalls, "The financial guys would come in with a lot of the stuff that nobody at the district understood." In an apparent attempt to help the school district make the right decision, JP Morgan recommended the financial advisory services of IMAGE, the

Investment Management Advisory Group, Inc. IMAGE employees were some of the staunchest backers of Act 23 in 2003, which allowed for the legalization of municipal swaps. Ultimately, JP Morgan and IMAGE were able to convince the board to enter the swap. They did not, however, disclose the value they placed in the swap or the amount of fees they expected to collect from the school district. Bloomberg data indicates that the contract was worth $2 million to JP Morgan, well over the $750,000 paid to the school and the bank's estimated $400,000 fees (Braun and Selway).

According to Christopher Cox, former chairman of the U.S. Securities Exchange Commission, financial advisers should "disclose their compensation and conflicts of interest to their customers" and school districts have a responsibility to their communities to make sure that their advisers are truly independent (Braun and Selway). In this case, both parties failed to perform their duties. The school district should have sought independent advice from a financial adviser that would have put the interests of the taxpayers first and foremost. Meanwhile, JP Morgan took advantage of a school board that had no idea what it was getting itself into. Since swap contracts are private, school districts have no way of determining whether a proposed swap is reasonable. As former Municipal Securities Rulemaking Board executive director Kit Taylor explains, "If you don't know how much you're paying, you're going to be paying too much" (Braun and Selway).

In the three years after Erie entered the swap, interest rates fell and the district's prospects in the swap soon became dire. As the future hefty swap payments that would be required of the school became clearer, the district voted to pay $2.9 million in termination payments to JP Morgan to cancel the deal. Ultimately, the bulk of Erie's losses were due not to negative interest rate movements but to a combination of poor financial background on the part of the board and unclear, excessive fees on the part of JP Morgan (Braun and Selway).

Section 3: Bethlehem School District

Of the many Pennsylvania school districts that have entered into interest rate swaps, the Bethlehem Area School District may have suffered the most. In the State College and Erie cases, we focused on examining the particulars of the swaps and explained that low interest rates and excessive hidden fees cost the schools millions of dollars. In this case, we will shift our focus to understanding exactly how millions of dollars in swap losses can affect a local community. According to Jack Wagner's previously discussed report, the Bethlehem Area School District entered into 17 swaps between 2003 and 2009, more than any other district in the state (Pennsylvania). As we learned in Chapter 2, an interest rate swap can be a useful tool for a firm looking to expand its financing options (to include paying loans with fixed payments). On the other hand, we also learned that even the most carefully planned swap introduces interest rate risk and credit risk. Detractors of municipal interest rate swaps claim that school districts should not be allowed to place taxpayer money at such significant risk.

Local newspaper *The Morning Call* investigated Bethlehem Area School District's swaps in an extensive four part-series in 2009. According to the report, the district was planning to build a new middle school and complete some high school renovations. Bethlehem made a series of interest rate swaps, with banks like Morgan Stanley and JP Morgan Chase, to fix and possibly lower borrowing costs for the building projects. Ultimately, because variable interest rates went down, the swap transactions cost the school $9.9 million in net swap payments and $25.4 million in termination payments (Derragh and Esack). These termination payments are calculated by determining the present value of the future canceled swap payments.

A look at the school's 2009-2010 budget can offer us some insights on how these swap losses affected the Bethlehem community. First, in an effort to collect additional revenue, the school decided to raise real estate taxes for local homeowners. In addition, the budget did not allow for any new major programs or staff additions for that school year. Vocational programs

like the district's Career Academy faced significant staffing cuts. Funding for existing programs, including Summer School, Intramural Sports, Driver's Education, and Curriculum Enrichment, was cut by more than half. Perhaps the most devastating cuts occurred in the school district's Special Education programs. Funding for the school's $650,000 SPARK early childhood program was cut entirely (Bethlehem Area School District). According to the Morning Call's report, pre-school is optional in Pennsylvania, and so districts receive very little funding for any programs outside the K-12 curriculum. SPARK was unique in that it offered children with developmental needs a chance to catch up to their peers in time for kindergarten. Unfortunately, the district's financial woes made it impossible to continue to provide the same level of support for these disadvantaged children (Derragh and Esack).

Of course, it would not be fair to blame all these cuts on Bethlehem's interest rate swap use, because all Bethlehem did was lock in a fixed interest payment. Even without the swaps, the school would have faced declining revenues and additional expenses during the financial crisis. When making the decision to enter an interest rate swap, the counterparties should be prepared for all possible outcomes. Such decisions should be made very carefully.

Section 4: Parkland School District

Not all Pennsylvania school districts have found interest rate swaps damaging. On the contrary, Parkland School District in Allentown has enjoyed consistent benefits from the swap it entered with the Royal Bank of Canada in 2004. According to an article by Tom De Martini, the Department of the Auditor General encouraged the school district to terminate its swap agreement in early 2013. The departmental report pointed to the Bethlehem case as an example of what could happen to Parkland if the school district was not careful. At the time, the Parkland school board explained that it did not plan to enter any new interest rate swaps and that it would terminate its existing swap as soon as it became financially feasible to do so. A year later,

however, the Parkland School District now has no immediate plans to terminate its swap contract. John Vignone, Parkland's director of business administration, claims that the $31 million interest rate swap is currently resulting in $8,000 to $10,000 net profits semiannually (because variable interest rates are now higher than the fixed rate). Terminating the swap would cost the district $170,000. Vignone claims that the swap is "benefitting the school district and it's benefitting the taxpayer." The district plans to re-examine the swap once each year to determine if it should continue (De Martini). For now, though, the Parkland School District serves as evidence that municipal swaps can have real benefits for local communities.

Section 5: Delaware River Port Authority

It's not only school boards that are finding themselves in serious trouble over municipal interest rate swap use. One such government unit is the Delaware River Port Authority, which oversees toll bridges connecting Southeastern Pennsylvania and New Jersey. According to Steve Halvonik from the Pennsylvania Department of the Auditor General, the agency entered into numerous interest rate swaps between 2000 and 2001 (Halvonik). Ultimately, the swaps backfired and landed the Delaware River Port Authority in some serious debt. Auditor General Jack Wagner wrote a letter to the agency in December 2009 calling for the board members to end any existing swaps and prohibit future use of swaps. The board agreed with Wagner, and adopted a resolution that prohibited future swaps and called for a close examination of all existing swaps (Halvonik).

In an article from the *Philadelphia Inquirer*, James Osborne provides details of how the Delaware River Port Authority came to this conclusion. In 2000, the authority received $45 million from investment banks when it decided to convert 75 percent of its debt, or $1.1 billion, into interest rate swaps. Rather than use the new funds to repay debt, the agency chose to invest it in new development projects. Because of the low interest rates brought on by the recession, the

authority wound up costing $13.7 million per year. The swaps led to a downgrading of the agency's credit rating, making it very difficult for the agency to find other ways to finance its debt. The swaps were created long before any of the current members of the Delaware River Port Authority assumed their positions. The decision to ban future swap use comes from leaders who hope not to repeat the mistakes of their predecessors (Osborne).

Section 6: City of Philadelphia

As the largest city in Pennsylvania, Philadelphia stands as a particularly interesting case in the interest rate swap debate. Sharon Ward from the Pennsylvania Budget and Policy Center believes that the School District of Philadelphia and the city government of Philadelphia are no different from all the other cases where interest rate swaps went awry. In her policy report entitled, "Too Big to Trust: Banks, Schools, and the Ongoing Problem of Interest Rate Swaps," Ward offers a detailed history of Philadelphia's municipal swap use over the last decade. Despite Ward's claims, however, it is easy to see that Philadelphia's use of derivatives involves more sophisticated financial planning and a deeper knowledge of risk management than we observed in the previous case studies.

We'll start by examining the School District of Philadelphia. According to its 2013 Comprehensive Annual Financial Report, the district is the largest public school district in Pennsylvania, and the eighth largest district in the United States. It operates 240 schools and educates about 11% of Pennsylvania's 1.7 million public school students. Moreover, around 80 percent of its students are from low-income families. As a result, the school requires significant financial planning and expertise. Since 2001, the five-member School Reform Commission has led the district. The governor of Pennsylvania and the mayor of Philadelphia directly appoint the members of the commission for their expertise on financial and budgetary matters. The Comprehensive Annual Report that the commission produces at the end of each fiscal year has

consistently been awarded a Certificate of Achievement for Excellence from the Government Finance Officers Association (GFOA) for superior financial reporting (School District of Philadelphia, 2013). Compared to the local school boards in State College or Erie, Philadelphia's School Reform Commission seems to be far more difficult prey for a pitch from an investment bank's ill-advised derivatives scheme.

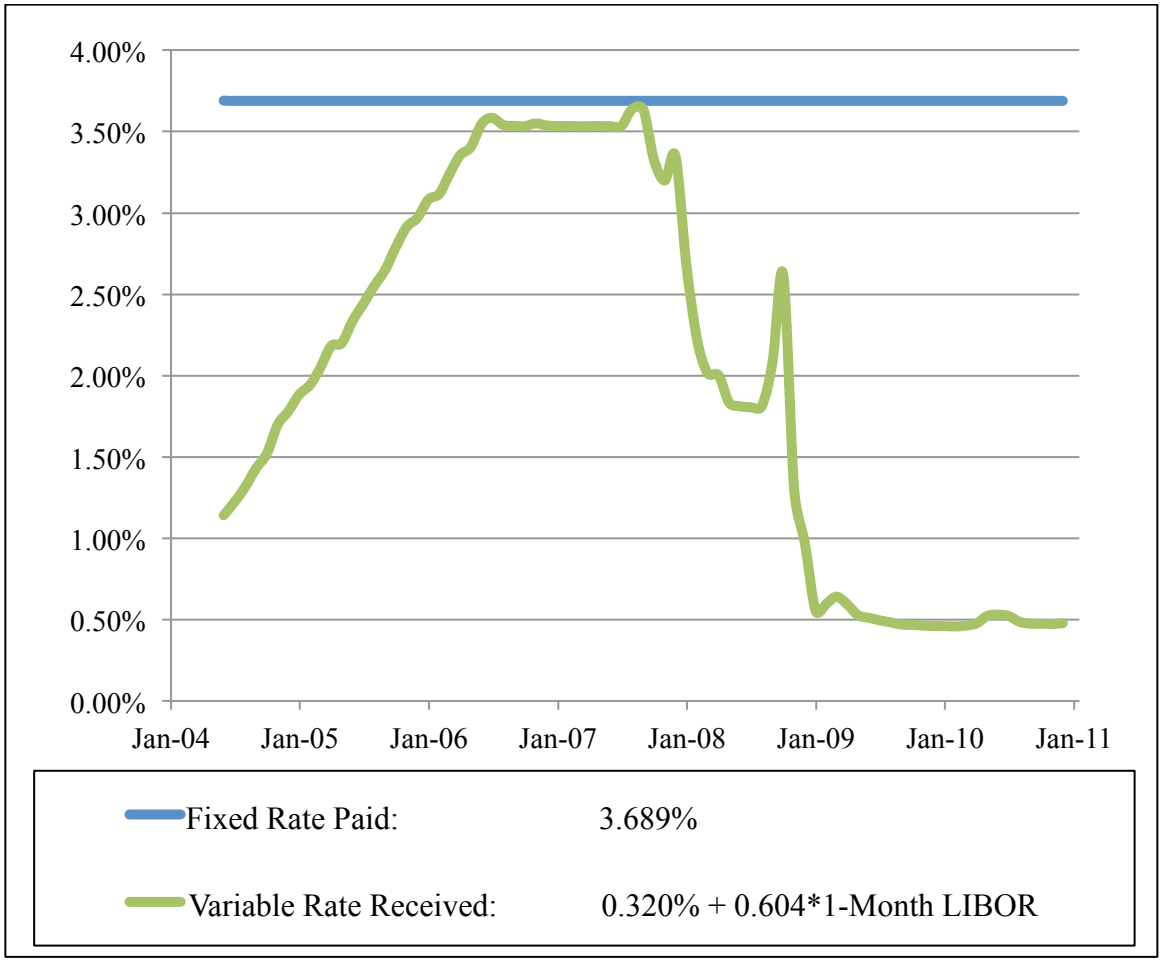
We will now take a close look at the school district's interest rate swap use over the last decade. In her previously mentioned policy report, Sharon Ward explains that the School District of Philadelphia issued floating-rate bonds in 2004 to support new school projects as well as to fund existing bonds. A potential increase in interest rates would make the new floating-rate bonds a more expensive liability for the school district. As a result, the school purchased 10 interest rate swaps from Goldman Sachs, Merrill Lynch, Morgan Stanley, and Wachovia to exchange its floating-rate debt for fixed-rate debt (Ward). The school district's 2005 annual report provides details of these swaps in a several-page analysis. The swaps allowed the school to borrow at a synthetic fixed-rate that was lower than what was available in the cash bond market. The analysis in the report includes the terms, fair values, and credit ratings of each of the outstanding swaps, as well as a lengthy discussion of the potential credit, basis, and termination risks that the district faced as a result of entering into the swaps (School District of Philadelphia, 2005). The analysis provides evidence of a degree of financial sophistication not present in the school districts discussed in the other case studies. The commission members compared alternative financing options, and agreed that entering into these swaps was the most suitable path.

Unfortunately, no amount of financial expertise could have prepared the School District of Philadelphia for the plummeting interest rates and financial crisis of 2008. In the original swap deals described in the 2005 annual report, the district agreed to pay synthetic fixed-rates ranging from 3.24% to 3.77%. In return, the investment banks would pay the district a variable rate based on a percentage of LIBOR. Near the beginning of the arrangement, the respective payments were

roughly equal (School District of Philadelphia, 2005). No matter how market rates changed in the future, the school would make specified fixed payments to the investment banks. If LIBOR were to increase, the school would receive larger payments in return. If LIBOR were to decrease, however, those payments from the banks would shrink. According to Ward, LIBOR dropped from 1.493% when the swaps began in 2004 to just 0.26% when the last swap was canceled in 2010. As she states in her report, "what started out as approximately equal payments turned into a nearly-one sided transfer." Ultimately, the school district decided to terminate its swaps rather than continue the payments it was forced to make under the deals. According to estimates provided by Ward in her policy report, the district paid $157,965,000 to the counterparties in the swaps and received $86,098,000 in return. The result was a net loss of $71,867,000. These estimates are based on the values presented in the district's annual reports, as well as the official statements on the original bonds. When added to the cancellation fees the district paid, the total cost to the district was roughly $160 million (Ward).

Figure 4-1 on the following page presents a comparison of the rates that the School District of Philadelphia paid and received in one of its interest rate swaps. In this particular swap, the school agreed to make payments at a fixed rate of 3.689% to an investment bank. In return, the bank paid the school at a variable rate of 60.4% of the going 1-Month LIBOR plus an additional 0.32%. The swap began in June 2004 and was canceled in December 2010 (School District of Philadelphia, 2005). From the figure, we can see that the fixed rate paid by the school nearly always exceeded the variable rate paid by the bank. Of course, there are certain budgetary benefits that come along with making predictable, fixed-rate payments. In addition, between 2006 and early 2008, the amounts that the school paid and received in the swap were similar. Ever since the financial crisis and the plummeting interest rates of 2008, however, it has been clear that the school was the ultimate loser in this arrangement.

Figure 4-1: Comparison of fixed and floating rates in a Philadelphia school district swap



Stipulations of the swap agreement were found in the School District of Philadelphia's 2005 Comprehensive Annual Financial Report. 1-Month LIBOR values were collected from FedPrimeRate.com.

Public schools were not the only government units in Philadelphia that suffered from interest rate swap use during the financial crisis. Ward's policy report explains how other government sectors entered into fixed-to-variable swaps to fund new projects or refund existing bonds. Fixed rates paid by these government units ranged from 3.829% to 4.53%, while variable rates paid by the investment banks were based on a percentage of LIBOR or the SIFMA (Securities Industry and Financial Markets Association) Municipal Swap Index. Ward estimates the city had lost approximately $170 million in these swaps as of July 2011. Affected government

units include the Philadelphia Authority for Industrial Development (PAID), the Philadelphia International Airport, and the Philadelphia Water Department. Unfortunately, Ward suggests that the city's woes are far from over. Many of the swaps are still active, and the SIFMA rate and LIBOR remain low (Ward).

Perhaps more than in any other city, the debate over municipal swap use has heated up in Philadelphia. As Romy Varghese from *Bloomberg* reports, Philadelphia had entered into $3.5 billion of swaps as of February 2013. State Senator Mike Folmer's bill to ban Pennsylvania entities from derivatives use would force the city to give up what it considers useful financial tools. When speaking of swaps, Philadelphia Director of Finance Rob Dubow stated, "We have financial professionals; we know how to do them and know how to structure them appropriately." Dubow is not alone in his support of keeping swaps legal for Philadelphia. Peter Shapiro, managing director of Swap Financial Group LLC, explained that Philadelphia is "more sophisticated than many corporations" and therefore should be allowed to take advantage of derivatives that will allow more efficient use of taxpayer funds. It is not as though the city government has done nothing to limit its exposure to risk involving the swaps. In response to the losses during the financial crisis, the city implemented new guidelines when it comes to derivatives use. Swap transactions must save at least five percent when compared to equivalent fixed-rate bonds. Moreover, swaps cannot take on more than 35% of total debt (Varghese). In addition, the supporters of a statewide ban may be overestimating the frequency with which swaps end badly. The plummeting interest rates brought on by the financial crisis of 2008 were highly unusual. According to a Bloomberg survey, investors are speculating that rates will rise in the near future. Entering in a swap to lock in fixed payments now could potentially make sense for city government units (Varghese).

Chapter 5

Evaluation and Potential Responses

Now that we have examined six real examples of municipal interest rate swaps in Pennsylvania, we are ready to answer our central research question: What are the economic consequences of these swaps? Interest rate swaps have benefitted some municipalities in Pennsylvania and damaged others. As we demonstrated in Chapter 2, interest rate swaps have real economic advantages. Swaps can help a firm manage its interest rate exposure, expand its set of financing options (so that they have the option of keeping the interest costs level), and reduce its borrowing costs.

School boards and local governments receive their revenue from local taxpayers. Some might argue that swaps allow these entities to put taxpayer money to efficient and sophisticated use. Proper interest rate swap management might allow the community to prosper. On the other hand, the terms of a swap contract are often very complicated, and few local government officials have the financial background necessary to determine the value of such contracts. In addition, the decision to enter into an interest rate swap exposes the purchaser to significant interest rate risk and credit risk. Opponents of municipal swap use might balk at putting taxpayer money into such complicated risky derivatives. Such detractors might suggest that municipalities stick with traditional bond financing.

In recent years, the debate has escalated and municipal swap use has become a hotly contested issue in Pennsylvania. Many politicians have offered their ideas on what should be done to resolve the risks that the swaps pose. Some, like former Pennsylvania Auditor General Jack Wagner, believe municipal swaps should be banned entirely (Pennsylvania). The State College Area School District board members agree (State College Area School District). Some contracts, like the swaption involved in the Erie case, probably should not have been allowed.

This approach, however, may not be appropriate for all swaps and all Pennsylvania municipalities. For example, the city governments of Philadelphia and Pittsburgh benefit from many sophisticated financial advisors who understand the particulars of interest rate swaps. Should such governments be denied the many benefits of interest rate swaps?

On the other end of the spectrum are those politicians who think nothing should be done. Falling on this side are lobbyists representing banks and financial institutions that may want to engage in municipal swaps. Many school districts are opposed to a ban. According to Romy Varghese from Bloomberg, the Pennsylvania School Boards Association would prefer increased oversight and disclosure requirements instead of a ban. Moreover, no state in the nation explicitly bans the use of swaps by cities and towns (Varghese). Yet, the people on this side of the argument ignore the many dangers posed by swaps. As we observed in the case studies, interest rate swaps involve not only interest rate risk and credit risk but also frequent excessive fees, misinformation, and lack of transparency. Should the money of local taxpayers be exposed to such dangers?

Ultimately, neither an outright ban nor accepting the status quo is an appropriate response. The best solution is one that would allow municipalities like Philadelphia and Pittsburgh the freedom to use interest rate swaps while preventing less sophisticated government bodies from getting involved in derivatives contracts without sound advice from independent advisers.

While this solution may take some creative thinking, it is not impossible to accomplish. For example, the state could place interest rate swaps and other derivatives contracts under official regulation by the Securities and Exchange Commission. (This would have to be done by the U.S. government since a state can't determine what the U.S. Securities and Exchange Commission must oversee.) Investment banks would be required to disclose all expected fees involved in the swap. The state could also recommend that the banks create illustrations demonstrating to any potential clients how different interest rate movements will affect their

position in a swap. Alternatively, the state could create a council of financial advisers that municipalities could hire to help make decisions related to swaps. Other advisers would need to prove to the state that they are acting independently of the investment bank offering the swap. Doing so would increase transparency and prevent possible collusion between the investment banks and financial advisers. Another idea would be for the state to make established limits on municipal swap use. As discussed in Chapter 4, the city of Philadelphia has adopted several guidelines to make sure that its interest rate swap use does not become unmanageable. By limiting swaps to a stated percentage of total debt, municipalities could benefit from some of the benefits of swaps without allowing themselves to be exposed to excessive interest rate risk. Perhaps a combination of these ideas could help to limit swap use but still allow Pennsylvania government leaders to take advantage of the benefits of swaps.

Chapter 6

Conclusion

For better or for worse, interest rate swaps have become very popular among school districts and local government units across the state. Most of the swaps have been private arrangements made between banks and local government officials. We've seen how disadvantageous interest rate movements, hidden fees, and a lack of transparency in the deals have led to serious problems with swaps in State College, Erie, Bethlehem, and many other areas in Pennsylvania. Many politicians, led by former Auditor General Jack Wagner, have called for an outright ban of the swaps to protect local communities and shield taxpayer money from excessive risk. Interest rate swaps, however, have real benefits, including expanding financing options and reducing borrowing costs. Local governments that have experienced financial planners should be able to take advantage of swaps if they have the tools to accurately evaluate the risks involved. As a result, the state of Pennsylvania should investigate new laws and restrictions that will allow some government units to use swaps while preventing less sophisticated units from getting in over their heads. Potential ideas include placing swaps under the direct regulation of the SEC or establishing certain transparency requirements related to fee disclosures. The state could also mandate that municipalities adopt guidelines to limit their swap use. All in all, interest rate swaps do have their place in the financial toolbox of Pennsylvania government leaders. Those leaders, however, have a tremendous responsibility to carefully consider whether a potential swap is truly in the best interest of the citizens they protect and serve.

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