Problems With Using the Internal Rate of Return to Make Decisions About Granting TIFs

by Paul Koch, Allen Ford and Raquel Alexander

Allen Ford is the Larry D. Homer/KPMG Professor of Accounting at the University of Kansas. Paul Koch is the O. Maurice Joy Professor of Business at the University of Kansas. Raquel Alexander is an assistant professor of accounting at the University of Kansas.

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States and localities are increasingly using tax increment financing (TIF) to encourage development. With TIF, property or sales tax revenue generated by a new development project within an established development district is used to subsidize the development. In the simplest case, investors agree to develop blighted property with the understanding that any increase in property taxes for some period of time will be returned to the investor directly ("pay as you go"). For example, if the property was formerly producing $100 of property taxes and later produces $5,000 of property taxes after the development improvements, the investor will receive the $4,900 increment in tax revenue from the property. If other property in the TIF district also increases in value following the development, and thus generates more property taxes, the investor might also receive that additional tax revenue. Alternatively, TIF proceeds can be used to pay for municipal bonds issued to pay for development infrastructure.

Public administrators and elected officials must determine whether or how much of a subsidy should be provided as enticement. Public administrators frequently rely on an internal rate of return (IRR) analysis to assess the need for a tax subsidy. Consultants may be retained to perform that IRR analysis because they have specialized expertise and are not subject to open records requests. However, it is well known that that analysis is highly sensitive to the assumptions made and suffers additional pitfalls that can lead to the wrong investment decisions.

As the analysis moves from the public managers' hands to a third-party consultant, it becomes even more critical to understand the IRR method, the underlying assumptions made, and the pitfalls of that analysis. TIFs have faced intense public scrutiny, and, as budget shortfalls become more acute, the public may become more critical of government subsidies of development projects. Therefore, public managers must be familiar with IRR calculations and how IRR can be distorted through the underlying assumptions.

The purpose of this article is twofold. First, we demonstrate how the IRR associated with a TIF project varies significantly because of seemingly innocuous changes in assumptions used. Second, we identify the pitfalls to avoid when making those decisions. We illustrate those points with a case study involving an actual TIF request in Lawrence, Kan., in 2008 and the corresponding consultant's report on the IRR of the project. We begin with a discussion of the fundamentals of IRR calculations with particular emphasis on the supporting assumptions. Next, we provide background on the TIF case study and present an IRR analysis in the case study. We conclude with recommendations for public managers using IRR calculations as support for the necessity of TIF financing.

Internal Rate of Return

The IRR is used to help analyze potential investments. The IRR is one measure of the yield on an investment over a period of time. Formally, the IRR is defined as the rate of return that equates the present value of the expected future cash outflows and inflows of an investment project.

As a simple example, Jane invests $1,000 to receive $50 of cash flow each year for 10 years before selling the investment in year 10 for $1,000.

The IRR is 5 percent in the above example, but it will be higher than 5 percent if you assume any of the following:

- higher sales price in year 10 (that is, more than $1,000);
- higher cash flow between years 1 and 10 (that is, more than $50); or
- lower investment required in year 1 (that is, less than $1,000).

The IRR is often used to assess whether a tax subsidy is needed for the investor to pursue the project. That assessment requires assumptions about the initial cash flows required to undertake the investment project, the future cash flows the project is expected to generate, the final value of the project, and the discount rate that is appropriate for the level of risk associated with the borrower and the project. Given those assumptions, the IRR of a project is calculated and then compared with an industry average IRR for similar development projects. The goal of this analysis is to help the governing body determine whether the TIF is justified (that is, required or necessary) to encourage the investor to pursue the project.

IRR analysis has strengths and weaknesses. It appropriately considers the timing and nature of the expected cash flows, as well as the time value of money. However, IRR analysis errs in several ways. First, it does not obey the value-additivity principle, and thus managers who use the IRR cannot consider multiple projects independently of one another. Second, IRR implicitly assumes that funds invested in a development project have an opportunity cost that equals the IRR of the project. That assumption is generally inappropriate since the true opportunity cost of cash flows should be the investor's market-determined opportunity cost of capital (that is, how much the investor has to pay to use other people's money). Third, the IRR rule can lead to multiple answers (rates of return) in some cases, when the expected future cash flow changes sign more than once. Finally, the IRR analysis ignores the point that the yield curve is not flat, so that the rate of interest an investor must truly pay to borrow for 1 year is not identical to the rate required to borrow for 5, 10, or 20 years (Brealey and Myers 2007).

Although all those problems with IRR analysis generally detract from its usefulness as a means to help investors make proper decisions, this report focuses on another problem with that analysis: that the IRR is highly sensitive to the assumptions made. As mentioned in the simple example above, the estimated IRR of a project will be higher if you change any assumptions that affect the future expected cash outflows and inflows. This report demonstrates how seemingly minor changes in the assumptions behind the expected future cash flows of an actual development project can profoundly affect the estimated IRR, in a manner that can lead to inappropriate conclusions about whether a TIF is justified.

The Oread Inn Project

We use the Oread Inn project in Lawrence, Kan., as a case study to examine the role of IRR in justifying TIF approval. Much of the information presented here is abstracted from the consultant's report unless otherwise noted. Our primary sources of information for the Oread Inn project are two reports prepared by the consultant: Redevelopment Project Financial Feasibility Study (Report I) and Oread TIF project -- Subsidy Feasibility Analysis (Report II).[1]

A group of investors (hereinafter the investor) submitted a proposal to invest $37 million to build a hotel near the edge of the University of Kansas in Lawrence. The hotel will have 92 hotel rooms and extended stay suites, and approximately 14 condominiums will be sold. "The eventual mix of condominium versus hotel uses within the structure will be determined by the market demand for luxury condominiums, balanced with the requirement for a minimum number of annual hotel rooms" (page 2 of Report II). Hotel guests will be one long block from the university's student union and a couple of blocks from the heart of the campus. The hotel will be located on a hill, and guests will be able to look down at the football stadium. The walk to the stadium will be less than two blocks.

The investor expects to sell the condos for $6 million by the end of 2009 at a profit of $480,000. Thus, $5.52 million of the investor's equity investment will be recovered quickly, as will be another $480,000 in profits.

Eight properties are currently in the TIF district, and the investor owns five of them. Four of the investor's properties will be razed to obtain the building site. Three of the remaining properties are residential rental, while the city owns the last one. The developer intends to improve the city property by installing fencing, landscaping, and benches.

The estimated project costs supplied by the investor are:

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[1] The consultant's two reports can be found at Commissioners, City of Lawrence, Kansas; *see* agenda and meeting archives for Feb. 12, 2008, *available at* http://www.ci.lawrence.ks.us/agendas.

Public infrastructure	$5,000,000
Parking garage	$6,000,000
Hotel/condos	$16,500,000
Pre-development, financial & misc	$7,125,768
Contingency [6.8%]	$2,374,232
Total Estimated Costs	$37,000,000

Not all the public infrastructure improvements are required by the city, but the investor desires more than the required improvements. For example, the investor intends to improve the walk and steps from the TIF district to the football stadium. The investor will be the major beneficiary of the improvements, although the general public should receive some benefit.

The parking garage is expected to have 210 parking stalls. The garage will be for valet parking for hotel guests (with a charge) and each condominium will include one parking stall. The contingency amount is to allow for an unexpected increase in costs. The sources of the funding are:

Condo sales	$6,000,000
Private debt	$21,000,000
Investor's equity	$10,000,000
Total	$37,000,000

The investor's view is that the cost of financing $11 million of the cost required to build the public infrastructure and parking garage should be subsidized by the local government.

TIF Eligible Costs

With TIF, the investor will be eligible to receive $11 million in taxes to cover its costs associated with the public infrastructure and parking garage, plus interest on the $11 million loan borrowed to finance those costs. In essence, taxpayers will be purchasing a parking garage that will belong to the investors, and taxpayers will pay interest on the debt incurred to purchase the garage as well as the infrastructure. However, under the TIF arrangement, the investor will recover only the $11 million plus interest if the hotel property, condos, and surrounding property generate enough sales taxes and incremental property taxes over the next 20 years.

The projected debt required for construction of the public infrastructure and parking garage is $11 million and the interest rate is prime plus 1 percent (7 percent when the proposal was being considered). Total interest expense is about $9.5 million if the $11 million in debt is amortized over 20 years. Therefore, the total potential subsidy will be more than $20 million ($11 million in TIF costs plus approximately $9.5 million in interest).

Sales Tax Subsidy

If TIF is granted, the Oread Inn investor will be entitled to receive the 1 percent city sales tax and the 1 percent county sales tax on its taxable sales.

In addition to TIF, the investor requested that the city authorize a transportation development district (TDD), which would allow the hotel to charge and keep an additional sales tax of 1 percent for 22 years. The consultant estimates that the investor would receive $917,095 over a 22-year period because of TDD, assuming a 1 percent growth rate in annual sales.

It is noteworthy that the TDD is paid only by those who use the hotel, restaurant, bar, and other commercial facilities within the hotel. As an alternative policy, the city could grant the TDD subsidy without granting TIF.

Annual sales are expected to be $5.45 million based on a 60 percent occupancy rate. The first-year occupancy rate is projected by the consultant to be 48 percent. Because the facility is near a tax-exempt institution (the University of Kansas), only 70 percent of the sales deemed to be generated by the project are expected to be subject to sales tax. The Oread Inn will have a restaurant, bar, conference facilities, and commercial rental property.

Property Tax Subsidy

In that TIF district, the city, the county, and the school district impose property taxes. The property tax payments deemed to be generated by the project will flow back to the investors from three sources: owners of the condos, the hotel, and the other three properties in the district. The investor will sell the condos and then receive property taxes generated by the condos for almost 20 years. For the hotel property, the investors will be able to own and operate the property for almost 20 years and will be reimbursed by the local government for the incremental property taxes that arise from the development. The owners of the other three properties will be effectively paying property taxes to the investors.[2]

The tax subsidy will include the property taxes generated in excess of the base year assessment. The base amount of property is valued at $4,025,140 and is assessed at $559,075. The property consists of residential property assessed at 11.5 percent and commercial property assessed at 25 percent.

Financial Analysis Necessary for Approval

In Kansas, local governments with formalized TIF policies require developers to prove, in order to justify granting the subsidy, that the project will not occur without the subsidy (the "but for" clause). When the request was being considered, Lawrence did not have a formal policy regarding TIF, but the consultant did refer to the but-for requirement in his report and when making his presentation. Lawrence is now in the process of adopting a formal policy that does have the but-for requirement. That requirement is typically implemented by conducting a financial analysis to determine whether the investor is likely to obtain an adequate return on the investment without the subsidy. In this case the investor provided its financial information to the consultant, who computed an IRR and made a recommendation.

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[2] The taxes will be paid to the county treasurer, and the tax subsidy payments will be made to the investor.

The consultant concluded that the IRR without the subsidy is likely to be between 5 percent and 10 percent, while the IRR with the subsidy is likely to be between 8 percent and 13 percent. The consultant recommended that the investor should hope to earn an IRR between 9 percent and 14 percent for similar development projects. Because the consultant's projected range for the IRR without the subsidy (5 percent to 10 percent) is mostly below that range (9 percent to 14 percent), and while the consultant's projected range with the subsidy (8 percent to 13 percent) is only slightly below that range, the consultant concluded that the investor needed the subsidy to make the investment.

In conducting that IRR analysis, the consultant assumed that the hotel will be sold after 10 years for between $27.7 million and $35 million. Note that the investor does not plan to sell the hotel. The use of a hypothetical sales price is a common practice used to arrive at an estimated IRR. However, there are many alternative valuation methods that could instead be used to project a future hypothetical sales price.

The Oread Inn Project IRR

To compute the IRR for the Oread Inn project as determined by the consultant, one needs to know the investment amount and the expected future cash flows projected by the consultant, including the assumed sales price in year 10. To project expected future cash flows, the consultant used the financial information provided by the investor. It is very difficult to determine the appropriate expected IRR, let alone reproduce the IRR determined by the consultant, without having the financial information used to make the computation. However, based on our analysis of information made available by the consultant, the appropriate expected IRR for that project without the TIF subsidy appears to be higher than the range of the 5 percent to 10 percent IRR publicly disclosed by the consultant.

The consultant made several critical decisions and assumptions to generate projections of the amount invested, the cash flows for the next 10 years, and a hypothesized sales price in year 10. Although some of those decisions are reasonable and appropriate, some are inaccurate and inappropriate. We examine several of those decisions, in turn.

First, the consultant used a 10-year period to compute the IRR, although the investor provided financial information for 16 years (p. 6 of Report II).

Second, when computing the IRR, the consultant did not properly account for the projected $480,000 of profit from the sale of the condos. We believe that it is a mistake to ignore the $480,000 of profit, because it represents cash provided by the purchasers of the condos, not by the investor. Accordingly, although the equity investment is shown in the consultant's report as $16 million, we use $15.52 million, which properly deducts the expected profit from the sale of the condos. Similarly, under source of funds, $6 million is provided by condo sales, which represent a return of the owners' equity of $5.52 million and $480,000 of profit.

Third, the consultant "reduced the project revenue and expenses by 5 percent to create a less optimistic case for the developer." The consultant also "reduced the cost of the project by 5 percent and the offsetting required debt and equity [by] 5 percent" (p. 6 of Report II). Those two adjustments have offsetting effects that are both positive and negative when computing IRR. Hence, we do not make those adjustments in our own computations. We see no more reason to try and create a less optimistic case for the investor than to create a more optimistic case for taxpayers who will pay more taxes if TIF is granted.

Fourth, the consultant assumed that 43 percent of the investor's equity commitment is expected to be invested in 2008 and 57 percent in 2009, while the $6 million of proceeds from the sale of condos is expected to be received in 2009. Thus, $6,673,600 (43 percent x $15,520,000) is to be paid by the investor in 2008, and the investor's net investment in 2009 is expected to be $2,846,400 (0.57 x $15.52 million - $6 million). A cash inflow of $6 million is included in 2009 because of the condo sales, although it is likely that some of that cash will be received earlier, in 2008.

Fifth, the projected sales price in year 10 is expected to be between $27.7 million and $35 million. The consultant determined that range for the expected sales price by using the investors' projected annual net operating income (NOI) from the project in year 10 along with a capitalization rate of 9.5 percent. In this analysis, we believe that the investor is projecting the sales price at the end of 2019, the 10th year of operations.

In our analysis we used $31.35 million, the midpoint of the range in the investor's expected sales prices, as our projected sales price in year 10. In addition, to be consistent with the investor's projection, that expected sales price is reduced to $29,782,500 after a 5 percent commission.

The consultant determined the expected sales price by capitalizing the expected NOI for year 10 using a 9.5 percent capitalization rate (p. 6 of Report II). Thus, we can determine that the consultant's expected NOI for year 10 is $2,978,250, assuming a sales price of $31,350,000 ($2,978,250/.095 = $31,350,000).

We estimate our projected cash flows for the 10 years by using this figure of $2,978,250 NOI for year 10. Then we work backwards to compute the projected NOI for earlier years, by assuming a 2 percent rate of growth in net cash flows over the 10 years. That assumption represents our attempt to duplicate the consultant's assumption that revenues and expenses would increase by 2 percent annually during the first 20 years. Finally, our projection for NOI during the first year is reduced further, because the consultant assumes that the occupancy rate for the hotel rooms will be lower that year (48 percent during year 1 compared with 60 percent for later years). The resulting expected NOI numbers over the first 10 years are then used as net cash flow numbers to compute the IRR.

Our estimated cash flows without considering debt payments are:

2008	($6,673,600)
2009	($2,846,400)
2010	$1,993,653
2011	$2,541,908
2012	$2,592,746
2013	$2,644,601
2014	$2,697,493

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2015         $2,751,443
2016         $2,806,471
2017         $2,862,601
2018         $2,919,853
2019           $2,978,250 + $29,782,500
            ($31,350,000 - 5% commission)
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Estimated Cash Flows Considering Interest and Debt Payments

The consultant assumed that the $21 million of debt would be amortized at 6.5 percent interest over 20 years. Given that assumption, the annual payment for debt service is $1,878,844, to be paid beginning in 2010. The balance of the debt at the end of year 10, as of December 31, 2019, is $13,788,917. The property is assumed to be sold at this time for $29,782,500 ($31,350,000 less 5 percent commission), and the remaining $13,788,917 debt is paid.

The following are the cash outflows and inflows after considering debt payments, the sale of the property, and retirement of debt.

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   2008        ($6,673,600)
2009        ($2,846,400)
2010           $114,809
            [The cash flow is $1,993,653 less $1,878,844]
2011           $663,063
2012           $713,902
2013           $765,756
2014           $818,648
2015           $872,598
2016           $927,627
2017           $983,757
2018         $1,041,009
2019     $17,092,989 [$2,978,250 - $1,878,844 +
         $31,350,000 - $1,567,500 - $13,788,917]*
*[cash flow in 2019 less debt payment in 2019 plus sales
price less 5% sales commission less payment of debt]
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Given those assumed cash flows, the IRR is computed to be 10.6 percent for our basic case. In contrast, the consultant reported that the IRR would be 5 percent to 10 percent, where the lower end of that range (5 percent) is based on an estimated sales price of $27.7 million, and the upper end (10 percent) is based on an estimated sales price of $35 million.

As stated above, we use a sales price of $31.35 million, the midpoint of the consultant's range of estimates, to compute an IRR of 10.6 percent. That result is much greater than the 7.5 percent midpoint of the consultant's estimated range of 5 percent to 10 percent for the IRR. If we also compute an analogous range to compare with the consultant's range, based on the range of projected sales prices rather than their midpoint, our estimated range for the IRR is 6.4 percent to 14.1 percent.

Changes in the Assumptions Affect the IRR

In Table 1 (p. 551), we summarize the consequences of several possible changes to the consultant's assumptions, for the resulting projections of IRR for this project. The top row of that table provides our basic case representing our best attempt to reproduce the consultant's estimate of the project's IRR, using its assumptions (which we present above). In each subsequent row in Panel A of Table 1, we change only one assumption at a time, to facilitate comparison with our basic case. That panel provides a powerful illustration of how the IRR is sensitive to small changes in each of the assumptions individually. In panels B and C of Table 1, we change more than one assumption at a time to illustrate how small changes in a few of these assumptions can compound the implied change in IRR.

First consider the implications of changing one assumption at a time, in Panel A of Table 1. The following list provides a number of examples showing how different assumptions made by the consultant each have a profound effect on the computation of IRR. Each example below corresponds with a different row in Table 1. This list is not complete, but is only provided to show how the computation of IRR is sensitive to many assumptions.

1. Cash flow in the first year will be significantly less than in later years, because the consultant assumes a lower occupancy rate the first year (48 percent occupancy rate the first year versus 60 percent for the remaining years). Our IRR calculation used the 48 percent occupancy rate in the first year, consistent with the consultant's report. That assumption seems unlikely to be accurate, because many people will be attracted to the newest hotel in town, and that assumption has a significant effect on IRR. When we revise the occupancy estimate for the first year to be 60 percent instead of 48 percent, the IRR will increase from 10.6 percent to 11.15 percent.

2. The occupancy rate is 48 percent the first year, and 60 percent over the next nine years of the project's life, as estimated by the consultant. In contrast to that assumption, the occupancy forecasts for full-service lodging in 2008 and 2009 are 68.9 percent and 68.5 percent, respectively (*Hospitality Directions -- U.S. Edition*, published by PricewaterhouseCoopers LLP, February 2008; also "Rough Road Ahead for Investors Korpacz Real Estate Investor Survey," First Quarter 2008). Based on that forecast, if the occupancy rate is assumed to be 54.4 percent during the first year, and 68 percent over the next nine years, the IRR is increased from 10.6 percent to 14.56 percent. Increasing the occupancy rate will increase NOI, which results in a higher assumed sales price.

3. The capitalization rate is 9.5 percent. Based on the Korpacz report for the first quarter 2008, that assumed 9.5 percent rate is higher than the appropriate rate for comparable properties in this class. Reducing the capitalization rate will increase the projected sales price in year 10, and thus increase the IRR. The overall cap rate for the national full-service lodging segment for the first quarter in 2008 is 8.33 percent. With a forecast period of five years, the cap rate for an owner/operator is between 6.5 percent and 8.5 percent, according to Korpacz. With an 8.33 percent cap rate, the expected sales price at the end of year 10 is $35,753,000, resulting in an increase in our basic IRR from 10.6 percent to 12.3 percent.

4. The project cost is $37 million. When costs are overestimated, the resulting IRR computation is too low. The project costs include $2,374,232 in contingency costs. Given the downturn in the construction industry, labor costs may be significantly less. If only $374,232 of the projected contingency costs is used, the investor might borrow

only $19 million instead of $21 million. In this case, with less debt, the IRR goes from 10.6 percent to 12.4 percent.

5. Interest rates are assumed to be constant over the life of the project. Importantly, the IRR increases as interest rates continue to decline. It is noteworthy that, since the time the project feasibility study was conducted, the prime rate has dropped twice. If the interest rate is assumed to be 6 percent instead of 6.5 percent, the IRR is increased from 10.6 percent to 11.23 percent.[3]

6. Investors' equity in the project is assumed to be a firm number. The IRR is increased if less equity is invested. As stated above, the consultant uses $16 million as the owners' equity, but this figure ignores the projected $480,000 profit projected from the sale of the condos. We did not ignore that projected profit, but instead used $15,520,000 as the owner's equity investment. Also, suppose the cost of the project turns out to be $2 million less than expected, as suggested in No. 4 above. In that case, the investor might reduce the equity invested instead of borrowing less as assumed in No. 4 above. With less equity invested under this scenario, the IRR goes from 10.6 percent to 13.5 percent.

During the public hearing on the merits of granting TIF for this project, the consultant said that this level of equity investment was fairly high for such a project and was not seen very often. Accordingly, if the investors reduce their equity investment to more normal levels, in line with the consultant's statement, and increase the leverage to be more consistent with industry norms, the projected IRR will increase.[4]

7. None of the condo proceeds are projected to be received in 2008 in the consultant's computation of IRR. In our attempt to reproduce the consultant's computations, we therefore assumed that no condo proceeds would be received before 2009. However, if partial payments are actually received in 2008, the IRR will increase. For example, if 10 percent of the payments for the condos is received in 2008, the IRR will be increased from 10.6 percent to 10.66 percent.

Next, consider the implications for the IRR computation of considering more than one of the above changes to the consultant's assumptions at the same time. Those examples are listed in panels B and C of Table 1.

In the first row of Panel B, we assume an occupancy rate of 68 percent and delete the assumption that first-year sales will be only 80 percent of normal occupancy rates. Combining those two assumptions increases the IRR to 15.22 percent. In the fifth row, the IRR is 14.21 percent if the interest rate is decreased from 6.5 percent to 6 percent and the amount of equity invested is reduced by $2 million. With Panel C, one can see

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[3] Although we are discussing only the IRR without a subsidy in this part of the report, the investor's case for obtaining a lower interest cost from the lender should be stronger if TIF is granted because of the significant increase in expected cash flows.

[4] Although the investor says that an equity investment of $16 million ($15.52 million according to our computations) will be made, the investor is not legally obligated to make that investment.

the effects of changing more than two assumptions. The analysis shows that the IRR could be almost 20 percent without any subsidy.

Other Possible Scenarios

Of course, there are many other possible scenarios that reflect additional deviations from the consultant's assumptions. As one such example, note that the consultant assumes the number of condos sold will not change. However, depending on demand, the investor could sell more condos and thereby further reduce the equity invested. An ideal investment is one in which you can recover your equity soon and still have a successful business. If the investor receives TIF, there will be a large incentive to sell more condos, because the investor will collect property taxes from the condo owners for almost 20 years. That development would also substantially increase the IRR.

As another example, consider additional potential cash flows to the investors generated by services provided to the condo owners. For example, each purchaser of a condo will receive a single parking space in the garage. However, it is likely that condo owners will own more than one vehicle and will thus need to purchase or rent additional parking spaces. The additional cash flow from the sale of additional parking spaces, or from the provision of long-term rentals, will increase the IRR.

Of course, there are many other potential complications and variations to the scenario that are too numerous to list that could also have a profound bearing on the computation of the IRR. Our comments and examples above tend to focus on how the IRR determined by the consultant could be understated, illustrating how modest changes in the assumptions can substantially increase the IRR. Those modest changes in the assumptions are well within the realm of reasonable possibilities, and these examples illustrate why the investors might find this project so appealing, with or without TIF financing.

However, we recognize that the IRR could also be overstated if the assumptions are not conservative enough. For example, a sharp increase in the interest rate or an occupancy rate that is lower than projected could cause the IRR to decline. Alternatively, if the investor is not able to sell any condos, the financial outlook would be substantially changed.

In summary, when we try to replicate the IRR computed by the consultant, we obtain an IRR estimate that is above the range of IRRs claimed by the consultant. Also, we believe that the consultant's assumptions are very conservative and therefore lead to a substantial understatement of the true IRR for this project.

Our Basic IRR Expressed as a Range

To compute the IRR for our basic case, we used a selling price equal to the midpoint of the consultant's range of expected selling prices, to make the presentation easier to read and to compare with the normal 11 percent rate of return that the consultant says is the average IRR appropriate for the full-service lodging segment of the hotel industry. The consultant determined that the IRR without a tax subsidy is between 5 percent and 10 percent. That is a very wide range and seems almost too wide to be useful to decision makers. Those who favor the subsidy are likely to focus on 5 percent, while those who oppose the subsidy are likely to focus on 10 percent, which is double the low rate.

The consultant presents a range for the IRR based on the projected range of selling prices after 10 years, so we provide our own estimates of the analogous ranges for IRR without any tax subsidy below:

IRR without any tax subsidy	Low	Mid-Point	High
Consultant's estimate	5.6%		10.0%
Our estimate	6.4%	10.6%	14.1%

Alternative Method for Estimating the IRR

A rough estimate of IRR using the capitalization rate, interest rate, and the debt-to-equity ratio can be found by:

Cap Rate + (Cap Rate - Int Rate)(Debt/Equity) =
Estimated Return on Equity Investment

If we use the above formula and the 8.33 percent cap rate provided by the Korpacz real estate survey for the first quarter of 2008 to estimate IRR for the Oread Inn investor, the IRR is 10.81 percent [8.33 percent + (8.33 - 6.5)($21 million/$15.52)].

The consultant said, "The Korpacz Real Estate Investor Survey, Third Quarter 2007, reports discount rates (IRR) for the full-service lodging segment from 9 to 14 percent with an average of 11 percent" (p. 6 of Report II). The 10.81 percent rate computed above seems to support the consultant's use of 11 percent as an approximation of the IRR that the investor should expect to earn on the project without a TIF subsidy.

It is important to note that the estimate of the return on equity of 10.81 percent from the simple formula above is very close to our basic IRR of 10.6 percent. However, this computation is not close to the midpoint of the consultant's range of 5 percent to 10 percent. Further, with the simple formula above, it was not necessary to determine the project's cash flows, debt payments, sales prices, and so forth. We used the 8.33 percent cap rate provided by a national survey and the 6.5 percent interest rate provided by the investor.[5] We do differ on the amount of equity investment, $15.52 million instead of $16 million, as explained above. Although the investor uses a cap rate of 9.5 percent to estimate the sales price after 10 years, we believe that rate is too high. If 9.5 percent is substituted for 8.33 percent in the formula above, the estimated IRR is 12.39 percent.

Conclusions and Recommendations

The IRR is an important ingredient in the due diligence process for TIF and other tax abatement proposals. Using a real life example, we have demonstrated the widely

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[5] "The permanent financing assumes 20 year debt with a 6.5percent interest rate (estimated by the developer)" (p. 4 of Report II).

varying values that can arise from this common analytical tool. Our analysis is based on the same information and assumptions used by the consultant, to the best of our ability. However, we obtain estimates of the project's IRR that are substantially above those reported by the consultant. As a result, using the consultant's own assumptions, we reach a different conclusion. We find that the project without a TIF subsidy is expected to generate an IRR that is well within the range of returns that an investor should normally expect to earn. Therefore, we find no support for the view that TIF is necessary for the investors to undertake that project. Based on the above numbers for the Lawrence investment project, it does not appear that a subsidy is appropriate. However, the TIF subsidy was granted and the TDD was created.[6]

As indicated earlier, the investor could receive a subsidy of as much as $20 million. If one considers the potential subsidies that may be received and the potential IRRs shown in panels B and C, it does not take much imagination to see an IRR of more than 20 percent.

Our analysis focuses on an investment project that would construct a hotel complex, but the same fundamentals apply to industrial, residential, retail, or mixed-use projects. Although our goal is to demonstrate how public administrators and elected officials can be easily misled, we do not suggest that the investors or the consultant involved in our case study acted inappropriately. On the other hand, we do recognize that any person or group wanting to obtain a particular result will understandably present the material in a manner that is favorable to obtaining that result. Of course, we also recognize that IRR analysis could be significantly distorted by those who might choose to act inappropriately. It is incumbent on the policymakers responsible for TIF or tax abatement decisions to become well informed about the underlying economic prospects for the project, as well as the costs and benefits of such a subsidy to all constituents.

Given that reality, we make two recommendations that will help to ensure that the policymakers responsible for the final decision have the relevant information necessary to properly weigh those costs and benefits. First, we recommend that the policymakers commission a financial (IRR) analysis funded by their own budget. If the policymakers choose and fund the study, they are more likely to receive information that portrays unbiased estimates of all the costs and benefits than if the study is funded by the investors who stand to gain from the tax subsidy. The cost to the taxpayer of funding that study is likely to be miniscule compared with the magnitude of any subsidy involved in the final TIF or tax abatement agreement. The goal of this recommendation is to increase the likelihood that the policymakers will get unbiased information that will be more likely to lead them to properly weigh the true costs and benefits of this policy decision.

Second, we recommend instituting a policy whereby any TIF or tax abatement decision would require a sensitivity analysis, such as that conducted here, to clearly illustrate how the IRR computation depends on many assumptions, both individually and collectively. The motivation for this recommendation is to help ensure that the policymakers are well informed about all the economic assumptions that are required

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[6] Lawrence City Commission meeting on Feb. 12, 2008.

to generate an IRR, and how they work together to generate the resulting IRR computation. It is noteworthy that, in our case study, we did our best to reproduce the assumptions made by the consultant on the Lawrence project, but our efforts resulted in an IRR that is well above the range of likely IRRs published in the consultant's report, and our IRR computation would lead to the conclusion that a TIF is not warranted for that project.

It is incumbent on the policymakers who are ultimately responsible for the TIF or tax abatement decision to become educated about the sensitivity of IRR analysis to seemingly innocuous changes in the assumptions. It is critical for any commissioned study to clearly present the assumptions made in its analysis and spell out how those assumptions lead to its IRR computation. Further, it is a small task for a consultant to conduct and present the sensitivity analysis we recommend above, so the costs of this requirement are low. Indeed, any serious authors of such a commissioned report will have conducted a sensitivity analysis as a routine part of their study to make sure that they clearly understand the implications of their assumptions. We are simply recommending that the policymakers require the authors to report the results of their own sensitivity analysis.

Table 1. Sensitivity of IRR to Assumptions About Lawrence Investment Project

This table provides a sensitivity analysis showing how the IRR of the Lawrence investment project changes when we alter the assumptions from our basic case. In this report we attempt to reproduce the consultant's computation of IRR for the Lawrence project, using the consultant's own assumptions. This attempt leads us to compute an IRR for the Lawrence project of 10.6 percent (which is above the range of likely IRRs indicated by the consultant). This scenario of assumptions and the resulting IRR is our basic case for comparison.

In Panel A we provide seven examples that illustrate the implications for that IRR computation when we change seven different assumptions behind the basic case, one at a time.

In Panel B we describe the implications for this IRR computation when we change two assumptions at a time, using several different combinations of the seven examples in Panel A.

In Panel C we describe the implications for this IRR computation when we change more than two assumptions at a time.

Basic Case		**IRR = 10.6%**
Panel A. Changing one assumption at a time from the basic case		
Consultant's Assumption	**Change in Assumption**	**IRR (%)**
1. Occupancy Rate: 1st year 48%; remaining years 60%	Occupancy Rate: 1st year 60%; remaining years 60%	11.15
2. Occupancy Rate: 1st year 48%; remaining years 60%	Occupancy Rate: 1st year 54.4% remaining years 68%	14.56
3. Capitalization Rate: 9.5%	Capitalization Rate: 8.33%	12.3
4. Project Cost: $37,000,000 Profit on Condos: $480,000 Investors' Equity $15,520,000 Investors Borrow: $21,000,000	Project Cost: $35,000,000 Profit on Condos: $480,000 Investors' Equity: $15,520,000 Investors Borrow: $19,000,000	12.4
5. Interest Rate constant at 6.5%	Interest Rate constant at 6%	11.23
6. Project Cost: $37,000,000	Project Cost: $35,000,000	

Profit on Condos: $480,000	Profit on Condos: $480,000	
		13.5
Investors' Equity: $15,520,000	Investors' Equity: $13,520,000	
Investors Borrow: $20,000,000	Investors Borrow: $21,000,000	
7. 0% of Condo Payments in 2008	10% of Condo Payments in 2008	10.66

Panel B. Changing two assumptions at a time from the basic case

1. & 2. Occupancy Rate: 1st year 48%; remaining years 60%.	Occupancy Rate: 1st year 68%; remaining years 68%.	
		15.22
1. & 3. Occupancy Rate: 1st year 48%; remaining years 60%;	Occupancy Rate: 1st year 54.4%; remaining years 68%;	
		16.06
Capitalization Rate: 9.5%	Capitalization Rate: 8.33%	
3. & 4. Capitalization Rate: 9.5%	Capitalization Rate: 8.33%	
Project Cost: $37,000,000	Project Cost: $35,000,000	
Profit on Condos: $480,000	Profit on Condos: $480,000	
		13.97
Investors' Equity: $15,520,000	Investors' Equity: $15,520,000	
Investors Borrow: $21,000,000	Investors Borrow: $19,000,000	
4. & 5. Project Cost: $37,000,000	Project Cost: $35,000,000	
Profit on Condos: $480,000,000	Profit on Condos: $480,000	
Investors' Equity: $15,520,000	Investors' Equity: $15,520,000	
		12.99
Investors Borrow: $21,000,000	Investors Borrow: $19,000,000	
Interest Rate constant at 6.5%	Interest Rate constant at 6%	
5. & 6. Interest Rate constant at 6.5%	Interest Rate constant at 6%	
Project Cost: $37,000,000	Project Cost: $35,000,000	
Profit on Condos: $480,000	Profit on Condos: $480,000	
		14.21
Investors' Equity: $15,520,000	Investors' Equity: $13,520,000	
Investors Borrow: $21,000,000	Investors Borrow: $21,000,000	
6. & 7. Project Cost: $37,000,000	Project Cost: $35,000,000	
Profit on Condos: $480,000	Profit on Condos: $480,000	
Investors' Equity: $15,520,000	Investors' Equity: $13,520,000	
		13.62
Investors Borrow: $21,000,000	Investors Borrow: $21,000,000	
0% of Condo Payments in 2008	10% of Condo Payments in 2008	

Panel C. Changing more than two assumptions at a time from the basic case

1., 3., & 4. Occupancy Rate: 1st year 48%; remaining years 60%	Occupancy Rate: 1st year 54.4%; remaining years 68%	
Capitalization Rate: 9.5%	Capitalization Rate: 8.33%	
		17.55
Project Cost: $37,000,000	Project Cost: $35,000,000	
Profit on Condos: $480,000	Profit on Condos: $480,000	
Investors' Equity: $15,520,000	Investors' Equity: $15,520,000	
Investors Borrow: $21,000,000	Investors Borrow: $19,000,000	
5., 6., & 7. Interest Rate at 6.5%	Interest Rate constant at 6.0%	
Project Cost: $37,000,000	Project Cost: $35,000,000	
Profit on Condos: $480,000	Profit on Condos: $480,000	
		14.34
Investors' Equity: $15,520,000	Investors' Equity: $13,520,000	
Investors Borrow: $21,000,000	Investors Borrow: $21,000,000	
0% of Condo Payments in 2008	10% of Condo Payments in 2008	
1., 3., 4., & 5. Occupancy Rate: 1st year 48%; remaining years 60%	Occupancy Rate: 1st year 54.4%; remaining years 68%	
Capitalization Rate: 9.5%	Capitalization Rate: 8.33%	
Project Cost: $37,000,000	Project Cost: $35,000,000	
		17.61
Profit on Condos: $480,000	Profit on Condos: $480,000	

Investors' Equity: $15,520,000	Investors' Equity: $15,520,000	
Investors Borrow: $21,000,000	Investors Borrow: $19,000,000	
Interest Rate constant at 6.5%	Interest Rate constant at 6.0%	
1., 3., 5., & 6. Occupancy Rate:	Occupancy Rate: 1st year 54.4%;	
1st year 48%; remaining years 60%	remaining years 68%	
Capitalization Rate: 9.5%	Capitalization Rate: 8.33%	
Interest Rate constant at 6.5%	Interest Rate constant at 6.0%	
		19.84
Project Cost: $37,000,000	Project Cost: $35,000,000	
Profit on Condos: $480,000	Profit on Condos: $480,000	
Investors' Equity: $15,520,000	Investors' Equity: $13,520,000	
Investors Borrow: $21,000,000	Investors Borrow: $21,000,000	

The potential benefits of presenting that sensitivity analysis are high, because that analysis will make it clear to the policymakers how the consultant's assumptions combine to result in the IRR computation and the conclusions that follow. That clarity will make it easy for the policymakers to focus their attention on the assumptions underlying the consultant's analysis and conclusion. That sensitivity analysis would help focus policymakers' questions and concerns on the assumptions that are at the heart of the issue, which would have a bearing on the economic potential of the project at hand, and thus would shed valuable light on the question whether the project truly has sufficiently limited economic potential on its own merits to deserve the tax subsidy being considered. Indeed, we suggest that the policymakers cannot be expected to properly exercise their duty of coming to a responsible decision unless they require such a sensitivity analysis and seriously consider the implications of that analysis.

References

Brealey, Richard A., and Stewart C. Meyers, *Principles of Corporate Finance*, 2007, New York: McGraw-Hill, Chapter 6.