Leveraged Buyout Model – Quick Reference

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Leveraged Buyout (LBO) Model Overview

A **leveraged buyout model** shows what happens when a **private equity firm** acquires a company using a combination of equity (cash) and debt, and then sells it in 3-5 years.

The PE firm aims to earn a **return** in the 20 – 25% range from doing this, which far exceeds the historical average annual return in the stock market.

Leveraged buyouts are similar to normal M&A deals, but in an LBO you assume that the buyer **sells** the target in the future.

In this quick reference guide, we'll cover the LBO concept and then how to set up a quick model that answers the key questions about a leveraged buyout.

The LBO Concept – How Does It Work?

A **leveraged buyout** is very similar to buying a house using a combination of a down payment and a mortgage – in both transactions, you **save money** by putting down a small amount in cash and then borrowing the rest.

In an LBO, the "down payment" is called **Equity** (cash) and the "mortgage" is called **Debt**.

The PE firm **uses debt to boost its returns**. All else being equal, **using more leverage (debt) means that the PE firm will earn a higher return on its investment**.

To see why this is true, consider the following scenario: you buy a company for **$100** using **100% cash** and then sell it 5 years later for **$200**. Let's compare that to what happens when you buy the same company for **$100**, but use only **50% cash** and sell it 5 years later, still for **$200** (shown as $150 here because the $50 in debt must be repaid):

Company Value:	$ 100				
Sale Value:	200				
Scenario 1 - 100% Cash Acquisition:					
Cash Used:	100.0%	$ 100			
Debt Used:	0.0%	-			
Purchase	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Exit**
$ (100)	$ -	$ -	$ -	$ -	$ 200
Return Multiple:					**2.0 x**
Internal Rate of Return (IRR):					**15%**

Scenario 2 - 50% Cash Acquisition:					
Cash Used:	50.0%	$ 50			
Debt Used:	50.0%	50			
Purchase	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Exit**
$ (50)	$ -	$ -	$ -	$ -	$ 150
Return Multiple:					**3.0 x**
Internal Rate of Return (IRR):					**25%**

You can see the massive difference – the multiple jumps from 2x to 3x, a 50% increase, and the IRR jumps from 15% to 25%.

And this analysis assumes that the $50 of debt we use in the beginning to purchase the company stays on its balance sheet until year 5 and that nothing is repaid.

In real LBOs, companies repay some of that debt over time, boosting the PE firm's returns even higher – in this case, for example, the IRR would jump to 32% if we completely repaid the debt and therefore received $200 for the company rather than the $150 here.

These numbers improve significantly with leverage because:

1. **Money today is worth more than money tomorrow** – earning more money 5 years from now is great, but it's significantly better to save that same amount of money today due to the time-value of money.
2. **It's easier to earn a high return on a smaller amount of money** – it's hard for portfolio managers with tens of billions under management to earn high returns, but it's easier for individual investors to earn high returns with, say, less than $1 million invested.

So that's why private equity firms use leverage – it significantly boosts their returns by reducing the upfront investment.

How to Build an LBO Model

We can divide the **LBO model** into an 8-step process:

1. **Determine** the purchase price and the amount of debt and equity required.
2. **Assign** percentage totals, interest rates, and repayment percentages to the debt tranches.
3. **Create** a Sources & Uses table to track how funds are used in the deal.
4. **Build** income statement projections based on assumptions for revenue and expenses.
5. **Calculate** Free Cash Flow and the cash available for debt repayment.
6. **Complete** the Debt Schedule and determine the mandatory and optional repayments.
7. **Link** the Debt Schedule to the cash flow statement and income statement.
8. **Calculate** investor returns and create sensitivity tables.

After we finish these 8 steps, you'll learn important Rules of Thumb for LBO Models and how to tell whether or not a deal is compelling – and what you can do to make it more compelling for investors – based on a few simple guidelines.

Step 1: Determine the Purchase Price and the Amount of Debt and Equity Required

Just as with the merger model, there's no formulaic way to determine the premium to the seller's current share price and how much the PE firm should pay. You look at a similar list of criteria to determine the price:

- Public comps, precedent transactions, and a DCF to **value** the seller.
- Recent **premiums** – what companies have paid over sellers' share prices to acquire them (usually in the 15-30% range).
- The maximum amount the PE firm can pay and still **earn an acceptable return**.
- The **EBITDA multiple** the PE firm is paying and how that compares to multiples of recent deals in the industry.

The main difference is that PE firms focus more on how the purchase price affects their **returns**, whereas "strategic buyers" (normal companies) care more about how it affects their EPS accretion / dilution.

Also, PE firms tend to place more weight on deals involving other PE firms – they would pay more attention to the EBITDA multiple that a rival firm paid to buy out a similar company than they would to the multiple that Microsoft or General Electric paid to acquire a similar company.

You calculate the **Diluted Equity Value** and **Enterprise Value** the same way as you would in a merger model, and you use the Treasury Stock Method to calculate diluted shares outstanding:

Transaction Assumptions			
Current Share Price:	$192.06	Equity Purchase Price:	$212,713
Offer Premium:	20.0%	Enterprise Value:	$177,318
Offer Price Per Share:	$230.47	EBITDA Purchase Multiple:	13.4 x
% Debt:	50.0%	Debt Required:	$106,357
% Equity:	50.0%	Equity Used:	$106,357
		EBITDA Exit Multiple:	10.0 x
Purchase Price Calculations:			
Basic Shares Outstanding:	900,678	Advisory Fee %:	0.02%
Basic Equity Value:	$207,581	Financing Fee %:	0.06%
Diluted Shares Outstanding:	922,947		
Diluted Equity Value:	$212,713	**Options Calculations - Purchase Price:**	
Less: Cash & Investments	$35,395		
Plus: Debt	$0		Exercise
Plus: Minority Interest	$0	Name / Number / Price / Dilution	
Plus: Preferred Stock	$0	Tranche A: 34,375 / $81.17 / 22,268	
Plus: Other Liabilities	$0	Tranche B	
Enterprise Value:	**$177,318**	**Total**	**22,268**

You can also see that we have a few new assumptions in addition to the standard Offer Premium, Offer Price and Equity Value / Enterprise Value calculations:

1. **% Debt and % Equity** – You base these on LBO deals for similarly sized companies in the industry. The percentages are important, but you also look at the **Leverage Ratio** – e.g. if the median Total Debt / EBITDA for other companies has been 3x, you would use something similar for this deal.
2. **Debt Required and Equity Used** – These are just the % Debt and % Equity multiplied by the Equity Purchase Price. If we were **refinancing debt**, we would add that refinanced debt to the purchase price and call it "Funds Required."
3. **EBITDA Exit Multiple** – This is the multiple at which the PE firm sells the company 3-5 years into the future. Make this the same as the EBITDA Purchase Multiple or slightly below the Purchase Multiple to be conservative, and use it as the baseline for the sensitivity tables.
4. **Advisory Fee % and Financing Fee %** – We skipped over these in the merger model, but you need to pay bankers, accountants, and lawyers to advise on the deal and to raise debt from investors. Typically the advisory fee is a small percentage of the equity purchase price, and the financing fees are a small but higher percentage of the total debt raised.

Once you've figured out the purchase price and debt and equity required and made these other assumptions, you can fill in additional details on the debt used in the transaction:

Step 2: Assign Percentage Totals, Interest Rates, and Repayment Percentages to the Debt Tranches

Broadly speaking, there are two types of debt used in LBOs: **bank debt** (also known as senior secured notes, secured debt, etc.) and **high-yield debt** (unsecured notes, "senior notes," unsecured debt, and so on).

The key differences:

- High-yield debt tends to have **higher interest rates** than bank debt (hence the name "high-yield").
- High-yield debt interest rates are usually **fixed**, whereas bank debt interest rates are **"floating"** – they change based on LIBOR or the Fed interest rate.
- High-yield debt has **incurrence covenants** while bank debt has **maintenance covenants**. Incurrence covenants *prevent* you from doing something (such as selling an asset, buying a factory, etc.) while maintenance covenants *require* you to maintain a certain financial performance (for example, the Debt / EBITDA ratio must be below 5x at all times).
- Bank debt is usually **amortized** – the principal must be paid off over time – whereas with high-yield debt, the entire principal is due at the end (**bullet maturity**).

In a sizable leveraged buyout, the PE firm uses both types of debt; they may **favor bank debt** if they want to reduce interest payments or if the company is planning a major expansion and they don't want to be hindered by incurrence covenants.

If the PE firm intends to refinance the company at some point or they don't believe their returns are sensitive to interest payments, they might **favor high-yield debt**. They might also use the high-yield option if they don't have plans to expand or sell off the company's assets.

There are multiple sub-categories and different types of bank debt and high-yield debt, but this quick reference guide is just an introduction to LBO models.

How do you decide on the appropriate amounts of bank debt and high-yield debt to use?

1. Look at the **percentages from recent, similar LBO transactions** – for example, maybe the median in your industry is 30% bank debt and 70% high-yield debt.
2. Calculate the **interest and principal repayment obligations** from different debt combinations, and determine what combination the target company is best-positioned to pay.
3. Use the **numbers suggested** by your Leveraged Finance / DCM group and / or other lenders.

Point #3 is important because in many LBO deals, other groups will give you the appropriate debt numbers to use or suggest numbers based on their knowledge of the market.

Picking the interest rates for debt and the percentage of principal that must be repaid each year is the same: you look at similar, recent deals and/or consult with other groups.

Generally, bank debt has floating interest rates tied to LIBOR and these rates are lower than the interest rates on high-yield debt, and anything from 1% to 20% annual repayment for bank debt is common.

Here's the setup in our model:

Debt Assumptions			
Debt %:	50.0%	Debt Required:	$106,357
Bank Debt %:	75.0%	Bank Debt:	$79,768
High-Yield Debt %:	25.0%	High-Yield Debt:	$26,589
Bank Debt Interest Rate:	8.0%	Bank Debt Principal Repayment %:	10.0%
High-Yield Debt Interest Rate:	11.0%	High-Yield Debt Principal Repayment %:	0.0%

You'll notice that we're "violating" the rule above about bank debt having a floating interest rate, but we've done that here in the interest of simplicity and making the model easier to understand.

Step 3: Create a Sources & Uses Table to Track How Funds are Used in the Deal

In addition to the debt and how much we're paying for the company, we need to understand how much **investor equity** is required – how much cash the PE firm has to put down to acquire the target.

This is different from the "Equity Used" in Step 1 because now we are adding in transaction fees – how much we pay to bankers, lawyers, and accountants to advise on the deal and to raise debt:

Sources & Uses				
Sources:			**Uses:**	
Bank Debt:		$79,768	Equity Value of Company:	$212,713
High-Yield Debt:		$26,589	Advisory Fees:	$43
Investor Equity:		$106,463	Financing Fees:	$64
Total Sources:		**$212,820**	**Total Uses:**	**$212,820**

Common Items in the Sources Column:

- Debt & Preferred Stock (all types)
- Investor Equity
- Excess Cash from Target
- Noncontrolling Interest Assumed
- Debt Assumed

Common Items in the Uses Column:

- Equity Value of Company
- Advisory, Legal, Financing, and Other Fees
- Refinanced Debt
- Noncontrolling Interest Assumed
- Debt Assumed
- Noncontrolling Interest Purchased

If debt is refinanced or noncontrolling interest is purchased outright, they would show up only in the Uses column. If they're assumed rather than paid off, they show up in *both* the Sources column *and* the Uses column.

There are a number of other items that could show up here and some additional detail on the ones above, but those are part of the More Advanced LBO Model and also the Advanced Modeling course; the list above is a good starting point if this is your first LBO model.

Step 4: Build Income Statement Projections Based on Assumptions for Revenue and Expenses

If you have income statement projections from your previous work with this company, this step is easy: link in everything from your other model.

If you don't have a 3-statement model already, this part will require more work. In a quick model, the simplest approach is shown below:

Operating Assumptions								
Initial Cash Balance:	$6,559							
Minimum Cash Balance:	$5,000							
	Historical			Projections				
	FY 2007	FY 2008	FY 2009	FY 2010E	FY 2011E	FY 2012E	FY 2013E	FY 2014E
Revenue Growth %:	27.2%	52.5%	14.4%	25.0%	17.0%	11.0%	9.0%	7.0%
COGS % Revenue:	66.2%	64.1%	59.0%	59.0%	59.0%	59.0%	59.0%	59.0%
R&D % Revenue:	2.4%	2.0%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
SG&A % Revenue:	11.1%	8.9%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%
Stock-Based Compensation % Revenue:	1.0%	1.4%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Depreciation & Amortization % Revenue:	1.3%	1.3%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%
Effective Cash Interest Rate:	5.3%	3.4%	1.4%	1.0%	1.0%	2.0%	2.0%	3.0%
Effective Tax Rate:	30.2%	31.6%	31.8%	30.0%	30.0%	30.0%	30.0%	30.0%
Amortization of Intangibles:				$40	$37	$28	$13	$10
Change in Working Capital % Revenue:	5.4%	5.5%	1.7%	4.0%	2.9%	2.0%	1.6%	1.3%
CapEx % Revenue:	3.0%	2.9%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%

Essentially you look at historical trends for revenue growth, expenses, and other items and create future projections that make sense:

- **Revenue Growth:** Assume a discount to the historical growth rates, with decreasing growth into the future.
- **Expense Percentages:** Make everything a percentage of revenue. You can use historical averages for these percentages (better) or simply straight-line the most recent percentages (not as reliable, but what we've done in the model above).
- **Tax Rate:** Link to the historical effective tax rates and / or what equity research analysts project for the next few years.
- **Amortization of Intangibles:** Pull from the schedule in the company's most recent public filing.
- **CapEx and Change in Working Capital:** Make both of these percentages of revenue, and use historical averages if possible or straight-line the most recent percentages.

When you're done, you should sanity-check these numbers with equity research projections to make sure you've come up with reasonable estimates.

Then, you can project the full income statement:

Income Statement								
	FY 2007	FY 2008	FY 2009	FY 2010E	FY 2011E	FY 2012E	FY 2013E	FY 2014E
Revenue:	$24,578	$37,491	$42,905	$53,631	$62,749	$69,651	$75,919	$81,234
Cost of Goods Sold:	$16,282	$24,049	$25,324	$31,655	$37,037	$41,111	$44,811	$47,948
Gross Profit:	$8,296	$13,442	$17,581	$21,976	$25,712	$28,540	$31,109	$33,286
Operating Expenses:								
Research & Development:	$596	$759	$830	$1,038	$1,214	$1,348	$1,469	$1,572
Selling, General & Administrative:	$2,724	$3,345	$3,566	$4,458	$5,216	$5,789	$6,311	$6,752
Total Operating Expenses:	$3,320	$4,103	$4,397	$5,496	$6,430	$7,137	$7,780	$8,324
Depreciation & Amortization of PP&E:	$327	$496	$734	$918	$1,073	$1,192	$1,299	$1,390
Amortization of Intangibles:	$0	$0	$0	$40	$37	$28	$13	$10
Stock-Based Compensation:	$242	$516	$710	$888	$1,038	$1,153	$1,256	$1,344
Operating Income:	$4,407	$8,327	$11,740	$14,635	$17,133	$19,030	$20,761	$22,218
Interest Income / (Expense):	$599	$620	$326					
Pre-Tax Income:	$5,006	$8,947	$12,066	$14,635	$17,133	$19,030	$20,761	$22,218
Income Tax Provision:	$1,511	$2,828	$3,831	$4,391	$5,140	$5,709	$6,228	$6,665
Net Income:	$3,495	$6,119	$8,235	$10,245	$11,993	$13,321	$14,532	$15,552
EBITDA:	$4,976	$9,339	$13,184	$16,480	$19,282	$21,403	$23,329	$24,962

All the numbers on the projected side are based on percentage growth rates, percentages of revenue, or are constant numbers based on existing schedules (amortization of intangibles).

Interest Income / (Expense) is blank because we need to finish the debt schedule and calculate the interest payments there first.

Step 5: Calculate Free Cash Flow and the Cash Available for Debt Repayment

There are several different variants of Free Cash Flow: Unlevered Free Cash Flow, Levered Free Cash Flow, Free Cash Flow to Equity, Free Cash Flow to Firm…

In a basic LBO model, we define Free Cash Flow as: Cash Flow from Operations minus Capital Expenditures.

Notice that that calculation *includes* interest income and expense because Cash Flow from Operations starts with Net Income, which includes interest income and expense. So effectively we are using Levered Free Cash Flow, or whatever you want to call it.

We're taking into account interest income and expense because **we need to determine how much cash the company really has available to repay debt**.

If we excluded interest income and expense we'd be saying, "Aha! Even though this company has massive interest payments on all their debt, we can just ignore all of that and still pay off debt principal anyway, as if the interest never existed"

One other note: if the company had existing debt and mandatory repayments on that debt and we did *not* refinance it in the deal, we would also have to subtract those repayments to calculate the Free Cash Flow number.

Remember, we need to to calculate **the amount of cash flow the company *really* has available to pay off new debt issued in the LBO.**

Here's how we might project the cash flow statement and calculate the cash available for debt repayment:

Cash Flow Statement								
	FY 2007	FY 2008	FY 2009	FY 2010E	FY 2011E	FY 2012E	FY 2013E	FY 2014E
Operating Activities:								
Net Income:				**$10,245**	**$11,993**	**$13,321**	**$14,532**	**$15,552**
Depreciation & Amortization of PP&E:				$918	$1,073	$1,192	$1,299	$1,390
Amortization of Intangibles:				$40	$37	$28	$13	$10
Stock-Based Compensation:				$888	$1,038	$1,153	$1,256	$1,344
Decrease (Increase) in Working Capital:				$2,136	$1,815	$1,374	$1,248	$1,058
Cash Flow from Operations:				**$14,225**	**$15,957**	**$17,068**	**$18,349**	**$19,355**
Capital Expenditures:				($1,430)	($1,673)	($1,857)	($2,024)	($2,166)
Free Cash Flow:				**$12,795**	**$14,284**	**$15,211**	**$16,324**	**$17,189**
Beginning Cash Balance:				$6,559	$5,000	$5,000	$5,000	$5,000
Plus: Free Cash Flow:				$12,795	$14,284	$15,211	$16,324	$17,189
Less: Minimum Cash Balance:				($5,000)	($5,000)	($5,000)	($5,000)	($5,000)
Cash Available for Debt Repayment:				$14,354	$14,284	$15,211	$16,324	$17,189

Note the following points:

- **D&A, SBC, the Change in Working Capital, and CapEx** are all percentages of revenue.
- **Free Cash Flow** = Cash Flow from Operations – CapEx.
- **Cash Available for Debt Repayment** = Beginning Cash + FCF – Minimum Cash Balance.

We need to assume a Minimum Cash Balance because all companies need at least *some* cash to continue operating, paying employees, and paying for standard expenses.

It's similar to how you might keep most of your assets invested in stocks or bonds, but how you still need a certain amount of cash in your bank account to cover normal living expenses.

We do not need to create a historical cash flow statement – it's completely optional and often a waste of time, because all we care about are forward numbers, i.e. what happens on the CFS *after* the LBO closes and the company is taken private.

Step 6: Complete the Debt Schedule and Determine the Mandatory and Optional Repayments

When you have 1 tranche of bank debt and 1 tranche of high-yield debt, the debt schedules are fairly straightforward and don't require complicated formulas.

That changes once you get into 5 – 10 tranches of debt, each with different terms, but for now we're focusing on an introductory LBO model rather than one with all the bells and whistles.

Here's what the debt schedule looks like – we'll go through each line after this screenshot:

Debt & Interest Schedules	FY 2007	FY 2008	FY 2009	FY 2010E	FY 2011E	FY 2012E	FY 2013E	FY 2014E
Beginning Bank Debt:				$79,768	$65,413	$51,129	$35,919	$19,594
Mandatory Repayment:				($7,977)	($7,977)	($7,977)	($7,977)	($7,977)
Optional Repayment:				($6,377)	($6,307)	($7,234)	($8,348)	($9,212)
Ending Bank Debt:				**$65,413**	**$51,129**	**$35,919**	**$19,594**	**$2,405**
Beginning High-Yield Debt:				$26,589	$26,589	$26,589	$26,589	$26,589
Mandatory Repayment:				$0	$0	$0	$0	$0
Optional Repayment:				$0	$0	$0	$0	$0
Ending High-Yield Debt:				**$26,589**	**$26,589**	**$26,589**	**$26,589**	**$26,589**
Interest Paid on Debt:				($8,732)	($7,587)	($6,407)	($5,145)	($3,805)
Interest Earned on Cash:				$346	$338	$677	$677	$1,015
Net Interest Income / (Expense):				**($8,386)**	**($7,248)**	**($5,730)**	**($4,469)**	**($2,790)**

- **Beginning Bank Debt:** In year 1, link this to the amount of bank debt used in the deal; in subsequent years link it to the ending balance from the previous years.
- **Bank Debt Mandatory Repayment:** –MIN(Bank Debt Principal * Principal Repayment %, Beginning Bank Debt in Year)
- **Bank Debt Optional Repayment:** –MIN(Cash Available for Debt Repayment – Mandatory Repayment, Beginning Bank Debt in Year – Mandatory Repayment)

The mandatory repayment formula says, "We'll repay either the amount required each year, or the entire balance at the beginning of the year if that's *less* than the annual repayment because we've already paid off so much of the principal."

Example: The annual repayment is $100 and the beginning debt balance is $1000. In this scenario, we would repay $100. But if the beginning debt balance were $50 we would repay only that balance of $50 instead.

The optional repayment formula says, "We'll repay all we can with the cash available, after making the mandatory repayment, **or** we'll repay the entire balance **minus** the mandatory repayment if that's a smaller number."

Example: The cash available for debt repayment is $100, the beginning debt balance is $1000, and the mandatory repayment is $50. In this scenario, we would repay $50 ($100 minus $50). But if the beginning debt balance were $50 instead, we would repay $0 because the mandatory repayment that year pays off the balance.

The high-yield debt formulas are simpler: the **mandatory repayment** one is exactly the same as the mandatory repayment formula for bank debt, but with different numbers (and it almost always reduces to $0 all the way across), and the **optional repayment** formula is set to $0 all the way across because optional repayments are not permitted on high-yield debt.

Moving onto the items at the bottom:

- **Interest Paid on Debt =** –AVERAGE(Beginning Bank Debt Balance, Ending Bank Debt Balance) * Bank Debt Interest Rate – AVERAGE(Beginning HY Debt Balance, Ending HY Debt Balance) * HY Debt Interest Rate.
- **Interest Earned on Cash =** AVERAGE(Beginning Cash Balance, Ending Cash Balance) * Effective Cash Interest Rate

You use AVERAGE formulas to reflect the fact that interest is paid and earned throughout the year – each month or each quarter – rather than just at the end of the year.

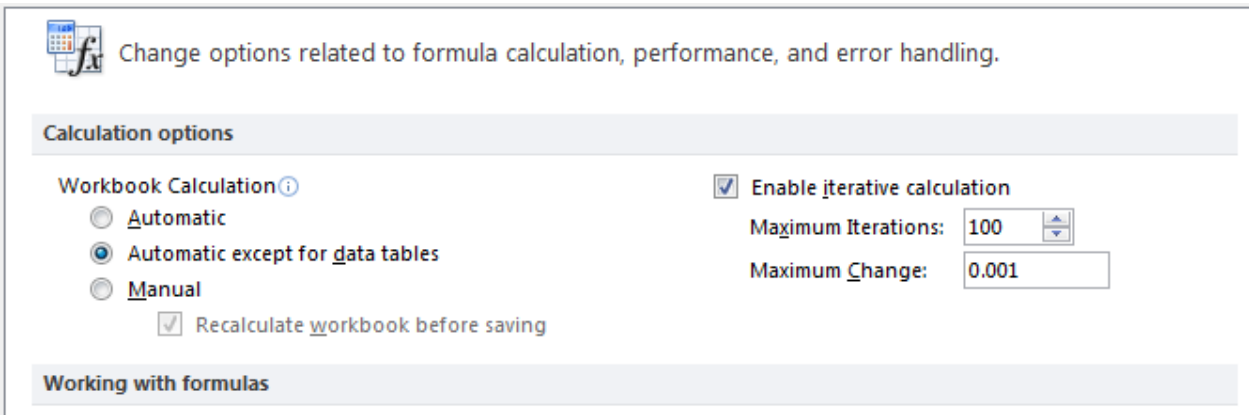
Although that's the more accurate method to determine interest income and expense, it does create a problem: **circular references**.

As a result of that formula, the net income and FCF depend on the interest income / (expense) when you link to the income statement – but the interest income / (expense), in turn, depends on the net income and FCF from the financial statements, so you get an infinite loop of calculations (called a **circular reference** in Excel).

You can solve that by using **iterations** and making sure that Excel is set up to properly handle circular references in the model by iterating to estimate anything dependent on circular calculations (see next section).

Step 7: Link the Debt Schedule to the Cash Flow Statement and Income Statement

First, make sure that your Excel program is set up to properly handle circular references. To ensure that they work correctly and that Excel does not crash, go to Options (Alt + T + O) and then the Calculations tab in 2003 or the Formulas menu in 2007 / 2010, and make sure that your menu looks like this:



If you do NOT have "Enable iterative calculations" checked you will run into problems.

With that out of the way, let's start with the income statement and link in the missing information, namely the Interest Income / (Expense):

Income Statement	FY 2007	FY 2008	FY 2009	FY 2010E	FY 2011E	FY 2012E	FY 2013E	FY 2014E
Revenue:	$24,578	$37,491	$42,905	$53,631	$62,749	$69,651	$75,919	$81,234
Cost of Goods Sold:	$16,282	$24,049	$25,324	$31,655	$37,037	$41,111	$44,811	$47,948
Gross Profit:	$8,296	$13,442	$17,581	$21,976	$25,712	$28,540	$31,109	$33,286
Operating Expenses:								
Research & Development:	$596	$759	$830	$1,038	$1,214	$1,348	$1,469	$1,572
Selling, General & Administrative:	$2,724	$3,345	$3,566	$4,458	$5,216	$5,789	$6,311	$6,752
Total Operating Expenses:	$3,320	$4,103	$4,397	$5,496	$6,430	$7,137	$7,780	$8,324
Depreciation & Amortization of PP&E:	$327	$496	$734	$918	$1,073	$1,192	$1,299	$1,390
Amortization of Intangibles:	$0	$0	$0	$40	$37	$28	$13	$10
Stock-Based Compensation:	$242	$516	$710	$888	$1,038	$1,153	$1,256	$1,344
Operating Income:	$4,407	$8,327	$11,740	$14,635	$17,133	$19,030	$20,761	$22,218
Interest Income / (Expense):	$599	$620	$326	($8,627)	($7,954)	($6,850)	($5,947)	($4,563)
Pre-Tax Income:	$5,006	$8,947	$12,066	$6,008	$9,179	$12,180	$14,813	$17,655
Income Tax Provision:	$1,511	$2,828	$3,831	$1,802	$2,754	$3,654	$4,444	$5,297
Net Income:	$3,495	$6,119	$8,235	$4,205	$6,425	$8,526	$10,369	$12,359
EBITDA:	$4,976	$9,339	$13,184	$16,480	$19,282	$21,403	$23,329	$24,962

There's not much to say here – everything else on the income statement is complete, so just link the interest line item to the last line of the debt schedule.

The cash flow statement takes more work:

Cash Flow Statement								
	FY 2007	FY 2008	FY 2009	FY 2010E	FY 2011E	FY 2012E	FY 2013E	FY 2014E
Operating Activities:								
Net Income:				**$4,205**	**$6,425**	**$8,526**	**$10,369**	**$12,359**
Depreciation & Amortization of PP&E:				$918	$1,073	$1,192	$1,299	$1,390
Amortization of Intangibles:				$40	$37	$28	$13	$10
Stock-Based Compensation:				$888	$1,038	$1,153	$1,256	$1,344
Decrease (Increase) in Working Capital:				$2,136	$1,815	$1,374	$1,248	$1,058
Cash Flow from Operations:				**$8,186**	**$10,389**	**$12,273**	**$14,186**	**$16,161**
Capital Expenditures:				($1,430)	($1,673)	($1,857)	($2,024)	($2,166)
Free Cash Flow:				**$6,756**	**$8,716**	**$10,415**	**$12,161**	**$13,995**
Beginning Cash Balance:				$6,559	$5,000	$5,000	$5,000	$5,000
Plus: Free Cash Flow:				$6,756	$8,716	$10,415	$12,161	$13,995
Less: Minimum Cash Balance:				($5,000)	($5,000)	($5,000)	($5,000)	($5,000)
Cash Available for Debt Repayment:				$8,315	$8,716	$10,415	$12,161	$13,995
Cash Used for Debt Repayment:				($8,315)	($8,716)	($10,415)	($12,161)	($13,995)
Beginning Cash Balance:				$6,559	$5,000	$5,000	$5,000	$5,000
Net Change in Cash:				($1,559)	$0	($0)	($0)	$0
Ending Cash Balance:				**$5,000**	**$5,000**	**$5,000**	**$5,000**	**$5,000**

The lines we need to fill in there:

- **Cash Used for Debt Repayment:** Sum the mandatory and optional debt repayments from the debt schedule.
- **Beginning Cash Balance:** Link to the ending cash balance from the previous year, each year.
- **Net Change in Cash:** Free Cash Flow minus the Cash Used for Debt Repayment.
- **Ending Cash Balance:** Sum the Beginning Cash Balance and the Net Change in Cash.

It's not terribly difficult because we only have 2 tranches of debt and it's easy to track what happens as they're paid off over time; a model with additional tranches of debt would require more formulas.

Step 8: Calculate Investor Returns and Create Sensitivity Tables

This is why we built the LBO model in the first place – to calculate the returns and determine whether or not the deal is attractive. To do that, we'll use the **IRR (Internal Rate of Return) function** in Excel and enter the appropriate purchase and exit information.

The **Internal Rate of Return**, by the way, just means the **discount rate at which the Net Present Value of cash flows equals $0**.

It's saying, "Ok, based on the cash flows we get in this analysis, **what return would we have to earn elsewhere each year over this period to get the same end result?**"

If the IRR comes out to 1%, it makes no sense to do the deal because you might as well put your cash in a high-interest savings account; if it comes out to 20% or 25%, though, that makes a lot more sense and you'd have trouble earning that much consistently with other investments.

Here's the screenshot, followed by the explanation:

Investor Returns								
	FY 2007	FY 2008	FY 2009	FY 2010E	FY 2011E	FY 2012E	FY 2013E	FY 2014E
EBITDA:			$13,184					$24,962
EBITDA Multiple:			13.4 x					10.0 x
Enterprise Value:			$177,318					$249,618
Investor Equity:			($106,463)	$0	$0	$0	$0	$230,700
IRR:			**16.7%**					

The first three lines in the "Purchase Column" are straightforward and are pulled from calculations in the Assumptions area at the top. The **Investor Equity** line item comes from the Sources & Uses table and represents how much in **cash** the PE firm is putting down (the "down payment") to acquire the company.

We need to use a negative sign there because of the way the IRR function works in Excel. Negatives represent investments and positives represent earnings on those investments.

Note the $0's in the 4 years in between – **we need those $0's because otherwise the IRR function does not work correctly in Excel.** We need to tell Excel explicitly, "We earn no cash flow in these years."

In the "Exit Column":

- **EBITDA** we pull directly from the income statement in our model above.
- The **EBITDA Multiple** comes from our assumptions area. Do not get obsessed over why we used 10x – that is just the baseline number for the analysis. **The range matters far more than this single number.**
- **Enterprise Value** = EBITDA * EBITDA Multiple
- **Investor Equity** = Enterprise Value + Cash – Remaining Outstanding Debt

Basically we're saying, "Upon exit, the PE firm must repay all the company's outstanding debt as part of its obligations as the owner. So the cash it earns upon selling the company is reduced by that amount. But it also 'gets' all the company's remaining cash at the end of the period since it's the owner."

This does **not always happen in real life**. Instead, these are just the standard assumptions you use in LBO models to make the purchase and the exit comparable.

The return of 16.7% here is decent but not spectacular. A PE firm would tolerate it but would generally target something in the 20 – 25% range to keep its Limited Partners (the PE firm's own investors, such as pension funds and insurance companies) happy.

So the next question in this analysis would be, "How does this return change with different assumptions? What if the purchase price, exit multiple, % debt used, revenue growth, or profit margins were different?"

I listed those because **those 5 factors tend to impact the returns in LBO models the most**. It's not worth your time to analyze something like the impact of interest rates or even less important items like the fee percentages – they may make a difference with big changes, but they still matter less than the 5 factors above.

Here's what our sensitivity tables look like for this deal (I'm not going to repeat how to create these here – see the Merger Model Quick Reference for instructions):

Sensitivity Analysis - 5-Year IRR and Purchase Premium vs. Exit Multiple

Purchase Premium / Per-Share Price		Exit Multiple:								
		6.0 x	7.0 x	8.0 x	9.0 x	10.0 x	11.0 x	12.0 x	13.0 x	14.0 x
$ 278.49	45.0%	(4.9%)	(0.5%)	3.1%	6.3%	9.2%	11.8%	14.2%	16.4%	18.4%
$ 268.88	40.0%	(3.1%)	1.1%	4.7%	7.8%	10.6%	13.2%	15.5%	17.7%	19.7%
$ 259.28	35.0%	(1.3%)	2.8%	6.3%	9.3%	12.1%	14.6%	16.9%	19.1%	21.1%
$ 249.68	30.0%	0.6%	4.5%	7.9%	10.9%	13.6%	16.1%	18.4%	20.5%	22.5%
$ 240.08	25.0%	2.4%	6.2%	9.5%	12.5%	15.1%	17.6%	19.9%	22.0%	23.9%
$ 230.47	20.0%	4.2%	7.9%	11.2%	14.1%	16.7%	19.1%	21.4%	23.5%	25.4%
$ 220.87	15.0%	6.1%	9.7%	12.9%	15.7%	18.4%	20.7%	23.0%	25.0%	27.0%
$ 211.27	10.0%	8.0%	11.5%	14.6%	17.5%	20.0%	22.4%	24.6%	26.7%	28.6%
$ 201.66	5.0%	9.9%	13.4%	16.4%	19.2%	21.8%	24.1%	26.3%	28.3%	30.3%
$ 192.06	0.0%	11.9%	15.3%	18.3%	21.1%	23.6%	25.9%	28.1%	30.1%	32.0%

Sensitivity Analysis - 5-Year IRR and Purchase Premium vs. % Debt:

Purchase Premium / Per-Share Price		% Debt:								
		30.0%	35.0%	40.0%	45.0%	50.0%	55.0%	60.0%	65.0%	70.0%
$ 278.49	45.0%	8.4%	8.6%	8.7%	9.0%	9.2%	9.5%	9.9%	10.4%	11.0%
$ 268.88	40.0%	9.5%	9.7%	10.0%	10.3%	10.6%	11.1%	11.6%	12.3%	13.2%
$ 259.28	35.0%	10.5%	10.9%	11.2%	11.6%	12.1%	12.7%	13.4%	14.3%	15.4%
$ 249.68	30.0%	11.7%	12.1%	12.5%	13.0%	13.6%	14.3%	15.2%	16.3%	17.6%
$ 240.08	25.0%	12.9%	13.3%	13.9%	14.4%	15.1%	16.0%	17.0%	18.2%	19.8%
$ 230.47	20.0%	14.1%	14.6%	15.2%	15.9%	16.7%	17.7%	18.8%	20.3%	22.0%
$ 220.87	15.0%	15.3%	16.0%	16.7%	17.4%	18.4%	19.4%	20.7%	22.3%	24.3%
$ 211.27	10.0%	16.7%	17.4%	18.1%	19.0%	20.0%	21.2%	22.6%	24.4%	26.6%
$ 201.66	5.0%	18.0%	18.8%	19.7%	20.7%	21.8%	23.1%	24.6%	26.5%	28.9%
$ 192.06	0.0%	19.5%	20.3%	21.3%	22.4%	23.6%	25.0%	26.7%	28.7%	31.3%

What do these sensitivity tables tell us here?

For one, the deal is not terribly sensitive to the percentage of debt used: even changing it from 30% to 50% only changes the IRR by 3 – 4%. It's much more sensitive to the exit multiple, as each 1x there results in 2 – 3% additional IRR.

That's not surprising because almost all deals are more sensitive to the exit multiple than they are to the percentage debt used. It would also be interesting to look at the impact of revenue growth and profit margins on the deal.

If we wanted to boost the returns here, the tables tell us that it's a better use of time to acquire the target for a lower purchase price since you can actually negotiate that upfront and since the IRR is still quite sensitive to the purchase price. You have little control over the exit multiple since it's dependent on market conditions years into the future.

Rules of Thumb for LBO Models

Above, we covered *how* you construct an LBO model. But there's more to understanding LBO models than just knowing how a model works mechanically.

In this section, we'll go over a few key rules of thumb and other facts you should know about leveraged buyouts and how and why they work.

Q: What is an "ideal" candidate for an LBO?

"Ideal" candidates should:

- Have **stable** and predictable cash flows (for debt repayments);
- Be **undervalued** relative to peers in the industry (lower purchase price);
- Be **low-risk** businesses (debt repayments);
- Not have much need for ongoing investments such as **CapEx**;
- Have an opportunity to **cut costs** and increase margins;
- Have a strong **management** team;
- Have a **solid base of assets** to use as collateral for debt.

Of these, the first point is the most important: no one will lend to a company and finance an LBO if that company's cash flows jump around unpredictably. That's why you don't see private equity firms buying out early-stage tech or healthcare startups.

Q: Let's say the return in an LBO model is too low. How could a private equity firm boost the IRR?

1. Reduce the Purchase Price in the model.
2. Increase the Exit Multiple.
3. Increase the Leverage (debt) used.
4. Increase the company's revenue growth rate (organically or via acquisitions).
5. Increase margins by reducing expenses (cutting employees, consolidating buildings, etc.).

Of these, #3 is usually the easiest to achieve since you only have to convince lenders to lend more aggressively. You can sometimes negotiate a lower Purchase Price, but there are limits to how low a company will go. And it's dangerous to assume too much about the Exit Multiple because it's highly dependent on market conditions in 3 – 5 years.

Boosting the Exit Multiple may be easier to achieve in **cyclical markets** (semiconductors, chemicals, and commodities, for example) where multiples fluctuate up and down every few years; some PE firms actually time their investments to take advantage of these market cycles.

Q: Can you tell what the returns will be without completing a full LBO model?

You can get a rough idea with these guidelines for a 5-year model:

- If the PE firm **doubles** its money (investors' equity) in 5 years, that's a 15% IRR.
- If the PE firm **triples** its money (investors' equity) in 5 years, that's a 25% IRR.

So you can make a quick estimate of the IRR by calculating how much the PE firm puts down initially and then seeing what the EBITDA and baseline EBITDA exit multiple in the last year are.

Figuring out how much debt is paid off is tricky, but to be conservative you could assume that all or most of the debt remains on the balance sheet; you could also link the debt repayments to EBITDA or FCF and create an estimate like that.

Q: How could you use an LBO model to value a company?

You would start by setting the target IRR you are aiming for and then back-solving in Excel (called the "Goal Seek" function) to figure out the maximum amount you can pay to reach that goal.

So you might say, "To earn between a 20% and 25% IRR in this 5-year period, the private equity firm could pay between $1 billion and $1.2 billion for the company, implying a valuation multiple between…"

Q: A strategic acquirer prefers to pay in cash when possible. Why would a PE firm prefer to use as much debt as possible in an LBO?

1. The PE firm does not intend to hold the company for the long-term – it sells it after a few years, so it is less concerned with how debt interest affects EPS and more concerned about using leverage to boost its returns by reducing the amount of capital it contributes upfront.
2. In an LBO, the debt is "owned" by the company, so they assume much of the risk. Whereas in a strategic acquisition, the buyer "owns" the debt so it is more risky for them.

Q: What is meant by the "tax shield" in an LBO?

This means that the interest a firm pays on debt is tax-deductible – so they save money on taxes and therefore increase their cash flow as a result of taking on debt in the LBO.

Note, however, that the company's cash flow is still **lower** than it would be without the debt – saving on taxes helps, but the added interest expense still reduces Net Income below what it would be for a debt-free company.

Q: What is a dividend recapitalization ("dividend recap")?

In a dividend recap, the company takes on new debt solely to pay a special dividend out to the PE firm that bought it.

It would be like if you made your friend take out a personal loan just so he/she could pay you a lump sum of cash with the loan proceeds.

Dividend recaps serve the same purpose as using leverage in the first place: they **boost returns**. In this case, they increase returns by increasing the cash flows to the PE firm over the 5-year period.

Those "$0's" in the 4 years in between purchase and exit in the returns calculation above would turn positive – at least in any years with dividend recaps.

On the balance sheet, additional debt is added to the liabilities & equity side and a large dividend reduces retained earnings by the same amount, also on the liabilities & equity side, to ensure balance.

Q: What is meant by a "cash flow sweep" in an LBO model?

This just means that we take the **excess cash after mandatory debt repayments** and use it to repay debt optionally and reduce debt principals where possible.

In the model here, the "cash flow sweep" refers to the "Optional Debt Repayments" line – whatever cash we have available to make *more* than the minimum required annual repayment.