2.5.1 Impact of Country and Currency on Investment Appraisal

Unit: Unit 1 – Treasury Strategy

Module: Module 2 – Risk and return

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Summary: The reading covers the complications which arise when making investment appraisal decisions for overseas and multinational investments. It also covers issues around different listing locations and whether this might change the cost of equity.

Keywords: net present value, profitability index, ungeared cash flows, purchasing power parity, Fisher effect, inflation, WACC, cost of debt, cost of equity, beta

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Learning outcomes:

After completing this reading and the associated exercises, you should:

1. Be able to understand the issues surrounding investment appraisal decisions when dealing with investments in foreign currencies and foreign countries.
2. Be able to understand the issues that might cause WACCs to change when used in a foreign context.
3. Be able to adjust WACC to cope with foreign issues.
4. Be able to manipulate purchasing power parity calculations.
5. Be able to understand issues arising from listing in different countries.

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1 Introduction

When we consider operations in different countries, once again we come across limitations in the Capital Asset Pricing Model (CAPM) theory and are faced with practical issues that need to be resolved.

The problems facing a treasurer will include:

- How to assess a project in a foreign country
- How to asses a project in several countries
- Should we assess a project in local currency or in our domestic currency?

Some examples that a corporate financier or treasurer may face could include:

Example 1: Projects in a foreign country
Voiceover Inc runs a successful mobile phone business in several states in North America. It is quoted and understands its cost of capital well. It wishes to grow and decides to invest in a mobile network in mainland China. It needs to know what hurdle rate to apply, bearing in mind the different risk in China and the different interest and inflation rates there. It also needs to know what currency to make the analysis in.

Example 2: Projects in several countries
Squeamish Software SaS (SSSaS) writes gaming software and is considering adapting some of its games for the Asian market, with appropriate style, appearance and gender variations. SSSaS plans to launch in several different countries at once, to achieve volume and marketing impact.

Each of the countries has a different interest rate, inflation and business friendliness. SSSaS needs to know a hurdle rate for such a venture.

These problems are not straightforward and it could be argued that we could be pushing the theory too far by asking some of these questions. However, some truths become apparent as we consider them. For instance, if inflation in a country is very high (and hence probably nominal interest rates), then it is clear that we would need a return, in nominal terms, to match or beat inflation.

Before we start to discuss the impact of operating in different countries on the cost of capital, we should highlight the fact that the academic and practitioner views on this topic vary considerably. All the tools and techniques used in this arena are to some extent a compromise and call for judgment on the part of the corporate financier or treasurer. This is an area where there are no right answers.

The overriding message is to try to compare like with like. We will also consider the issue of listing jurisdiction, to see if a firm might get some advantage by choosing one such jurisdiction over another.

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2 Project in a foreign country

We need to find a method to compare projects in foreign countries or in different currencies.

Example 3: Project analysis
Klein AG makes specialist bottles (Klein bottles) and wishes to manufacture and market the bottles in new countries for growth. It has limited funds for investment.

Klein has selected Mexico or Brazil as having sufficient demand, but can choose only one. It needs to be able to assess the cash flows from the projects on a like for like basis.

There are two ways we can do this:

- Discount local cash flows using a local WACC and convert the resulting NPV to the domestic currency at the spot rate for comparison purposes. (If using IRR we don't need to worry about exchange rates, but we still need to know the local WACC as this will be the hurdle rate).
- Convert the local cash flows to the domestic currency using forward exchange rates and discount using the domestic WACC.

Later, in the section on Purchasing Power Parity, we shall show that these two methods are theoretically equivalent as long as the components, such as beta and market premium, of the WACC, are the same.

To apply the second approach, all we need to know is the forward exchange rates. However, to apply the first approach, we need to calculate a local WACC.

Before we try and work out a method for this let us consider each component of WACC to see how they may change. We recall that the components of a WACC are made up of:

Cost of equity = $R_f + \beta(R_m - R_f)$
which will vary with:

R_f	The risk free rate,
β	Beta
$(R_m - R_f)$	Market risk premium

The cost of debt comprises R_f plus loan margins, which we also discuss.

2.1 The risk free rate

The nominal risk free rate is a theoretical construct which doesn't exist in reality. It is generally taken to be the interest rate on Government Bonds. Ignoring maturities, the interest rates on the bonds of German, UK and US governments are all different. The underlying inflation in each currency is probably the most important differentiating factor for high quality government bonds, but by no means the only one. Credit considerations are also important, particularly following the Financial Crisis and the sovereign debt problems in the Euro Zone. At best we

can say that there is a real risk free rate for each currency for each tenor. In the Euro Zone this is even more complicated as the credit considerations for each country are different.

The local risk free rate will probably be the most appropriate in any project analysis for calculating the cost of equity. Using other rates will simply introduce other factors.

Damodaran, Applied Corporate Finance, 3rd Edition, has a piece titled *Country Bond Default Spreads* on page 111 which throws some interesting (and practical) light on this issue.

'Country bond default spreads' on page 111 from Applied Corporate Finance, by Aswath Damodaran, 3rd edition, throws some interesting (and practical) light on this issue.

2.2 Beta

We have already seen that beta will vary by sector, being a measure of risk and we have shown that one approach to investment appraisal is to use a different beta to vary the cost of capital for different projects. We could use a similar approach when adopting a beta for different countries. However, we do face a few problems trying to work out what a suitable beta might be for a foreign country. We will run into calculation problems.

The average beta of a market will be one, but does this apply globally or nationally? For example, if we invest in India, we cannot look at the beta of the Indian market equivalents as that will have an average of one and constituents will be compared to that, whereas in fact the Indian market as a whole may be much riskier than the domestic market. Each market will have a different portfolio which will also make the market portfolio different. Using a global measure should work but this is starting to stretch theory and calculation to the limits.

Ideally, therefore, the local beta will probably be more suitable.

2.3 Market risk premium

Historical analysis shows that this varies from one market to another.

See Table 4.4 Historical Equity Risk Premiums by Country on page 111 from Applied Corporate Finance, by Aswath Damodaran, 3rd edition. *The fifth column (Stocks Minus Long-Term Governments; Geometric Mean) is probably the most useful. This gives a long term average of 4.06% in the UK and 4.52% in the US, with a low of 1.80% for Switzerland and a high of 6.22% for Australia.*

Clearly the market risk premium is different from one country to another. Again, the local risk premium is arguably more appropriate.

2.4 Loan margins

Loan margins will principally be determined by credit considerations which should arguably be similar in different countries and demand and supply issues which may well vary. More pertinently, it would seem perverse to use rates for the cost of debt other than those which are actually being experienced. Again, local figures are preferable.

2.5 An approach

It appears to be most intuitive here to use the risk free rate for the local currency and the market risk premium for the country of investment, to derive a local WACC if that data is readily available. However, if we take the example of UK quoted company investing in France, the UK company's shareholders are probably all looking for a return based on UK Government bonds and the market risk premium for the London Stock Exchange. There is no guarantee that adopting measures for the French market will deliver returns appropriate for the UK shareholders. Nevertheless, this is the most commonly adopted approach. This is the "bottom-up" approach looking at the constituent parts of the organisation.

The alternative is to start with the UK inputs, a "top down" approach.

Although theoretically the same, there are differences in practice, principally due to different market risk premiums which aren't really affected by inflation; differences in the risk free rates; and differences in beta. The two approaches will lead to different outcomes in practice.

Whilst it would be usual to use the market risk premium for the country of investment, Damodaran reminds us that we should only be rewarding undiversifiable risk. Surely a global investor, investing across stock markets, should be able to diversify this risk away? This in turn depends on how correlated stock markets are. Historically, different stock markets were not highly correlated, so diversification reduced risk. However, with increasing globalisation, stock markets appear to be more highly correlated. Damodaran argues that we should consider augmenting the cost of equity to reflect that portion of country risk that is not diversifiable. As we said at the outset, there are no right answers.

The formula needed here is:

$$\text{Local Currency WACC} = \text{Domestic WACC} \times \frac{1 + \text{Currency Inflation}}{1 + \text{Domestic Inflation}}$$

Example 4: Local currency WACC

Klein AG, based in Europe, wishes to calculate the WACC suitable for Canada. Its domestic WACC is 8.5%, local inflation is 3% and Canadian inflation is 5%. Canadian WACC is calculated as follows:

$$\text{Local Currency WACC} = \text{Domestic WACC} \times \frac{1 + \text{Currency Inflation}}{1 + \text{Domestic Inflation}}$$

$$\text{Local Currency WACC} = 0.085 \times \frac{1 + 0.05}{1 + 0.03}$$

Local currency WACC = 8.67%

However, this formula does not work very well in certain circumstances,

Example 5: Local currency WACC

Klein AG wishes to calculate the WACC suitable for Brazil. Its domestic WACC is 8.5%, local inflation is 3% and Brazilian inflation is 11%. Brazilian WACC is calculated as follows:

$$\text{Local Currency WACC} = \text{Domestic WACC} \times \frac{1+\text{Currency Inflation}}{1+\text{Domestic Inflation}}$$

$$\text{Local Currency WACC} = 0.085 \times \frac{1+0.11}{1+0.03}$$

Local currency WACC = 9.16%

It does not make sense that a local WACC should be below inflation. A more reliable way to approach this would be as follows:

Convert domestic nominal WACC to domestic real WACC

$$\text{Real WACC} = \frac{1+\text{NominalWACC}}{1+\text{Domestic Inflation}} - 1$$

=((1+0.085)/(1+0.03))-1
=5.34%

Convert real WACC to foreign nominal WACC

$$\text{Local Nominal WACC} = [(1+\text{Real WACC}) \times (1+\text{Localinflation}) - 1]$$

=[(1+.0534)x(1+0.11)-1
=16.93%

This is clearly a better approach where the risk free rates and inflation are substantially different.

3 Projects in multinationals – currency effects

Multinationals will be undertaking projects in several jurisdictions. Project comparison across currencies can be complicated by scale. For example, a project in India stated in Rupees will be difficult to compare to a project stated in Sterling as £1 was worth approximately 87 Rupees at August 2016.

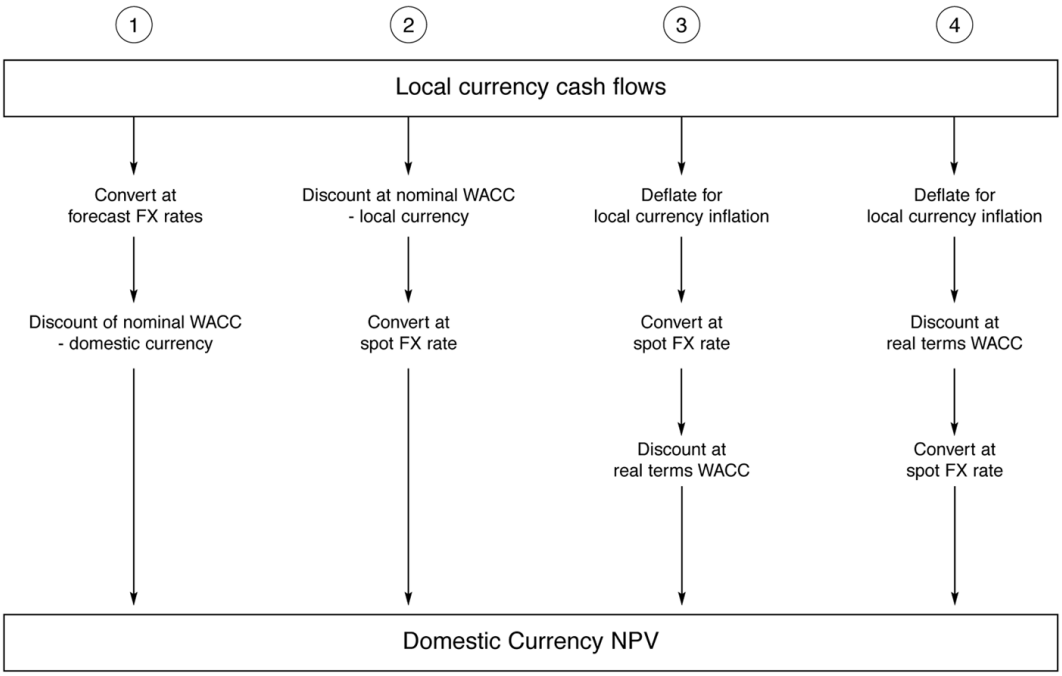
The treasurer must find some way of comparing like with like. There are several ways through this but usually projects are brought back to one currency, usually the domestic currency, in nominal terms and compared with the domestic WACC. Many multinationals go one step further and assess all projects in real terms in the same currency, although real terms analysis

really only makes sense when comparing long dated projects or where there is high inflation in the domestic currency or currency of investment.

4 Purchasing power parity (PPP) case study

Where we wish to bring cash flows back to the domestic currency there are several equivalent ways to achieve this and the following table summarises 4 equivalent methods for calculating domestic currency NPV based on un-geared foreign currency cash flows. The theory can just as easily be applied to the cost of equity and geared cash flows.

Methods 1 and 2 are reasonably intuitive



This section includes a working example to show the equivalence of the four approaches seen above.

Example 6: Purchasing power parity

Consider a local currency cash flow occurring in 5 years' time of 100. Local inflation is 10%. Domestic inflation is 2%. The real terms WACC is 6%. The spot exchange is 4 and the 5 year forward rate is 5.8348.

First calculate the nominal WACCs. Rearranging the Fisher formula we, see

$$\text{Nominal WACC} = ((1+\text{Real WACC})\times(1+\text{Inflation}))-1$$

In domestic currency terms:

Nominal WACC = (1.06 x 1.02) - 1 = 0.0812 = 8.12%

And in local currency terms:

Nominal WACC = (1.06 x 1.10) – 1 = 6.166 = 16.6%

Method 1

$$\text{Spot value of future cash flow} = \frac{100}{5.8348} = 17.14$$

$$\therefore \text{PV(Domestic Currency)} = \frac{17.14}{(1+8.12\%)^5} = 11.6$$

Method 2

$$\text{PV(Local Currency)} = \frac{100}{(1+16.6\%)^5} = 46.4$$

$$\therefore \text{PV(Domestic Currency)} = \frac{46.4}{4} = 11.6$$

Method 3

$$\text{Local cash flow in real terms} = \frac{100}{(1+10\%)^5} = 62.1$$

$$\text{Converted to domestic currency at spot} = \frac{62.1}{4} = 15.525$$

$$\therefore \text{PV(Domestic Currency)} = \frac{15.525}{(1+6\%)^5} = 11.6$$

Method 4

$$\text{Local cash flow in real terms} = \frac{100}{(1+10\%)^5} = 62.1$$

$$\therefore \text{PV(Local Currency)} = \frac{62.1}{(1+6\%)^5} = 46.4$$

$$\therefore \text{PV(Domestic Currency)} = \frac{46.4}{4} = 11.6$$

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Now, we can see that the 4 methods have all produced the same result, but why is this?

It is fairly straightforward to see that Methods 2 and 3 are equivalent. For this to be true:

$$(1+16.6\%)^5 \times 4 = (1+10\%)^5 \times 4 \times (1+6\%)^5$$

$$\therefore 1+16.6\% = (1+10\%)\times(1+6\%)$$

which is simply the relationship between the real and nominal WACCs. The equivalence of Methods 3 and 4 is even more straightforward as the only difference is the order of the arithmetic.

For Method 1 to be equivalent to Method 2 (and all the other methods):

$$5.8348 \times (1+8.12\%)^5 = 4 \times (1+16.6\%)^5$$

$$\therefore 5.8348 = \frac{4 \times (1+16.6\%)^5}{(1+8.12\%)^5}$$

using the relationship between the real and nominal WACCs, we can write:

$$5.8348 = \frac{4 \times ((1+6\%)\times(1+10))^5}{((1+6\%)\times(1+2\%))^5}$$

$$\therefore 5.8348 = \frac{4 \times (1+10\%)^5}{(1+2\%)^5}$$

In other words, the forecast forward exchange rate is equal to the spot rate adjusted for the relative inflation of the two currencies.

This is the *Purchasing Power Parity theory of exchange rates*, which is often used for projecting exchange rates where no forward rates are available. It is often used in modelling scenarios where future exchange changes are determined using the current spot rate and future inflation expectations for the relevant currencies.

5 Listing in different jurisdictions

We now consider whether a company can gain an advantage by listing in a particular jurisdiction. Note that London has been popular with many mining firms and we often see speculation about sports teams floating in Asian markets, for example. Essentially each firm choosing a location will wish to lower the cost of capital as far as possible, either by considering whether a bloc of investors will find it easier to trade in that market, or there are more or wealthier investors, or simply that the cost of flotation is cheaper there.

6 Listing jurisdiction case study

It is possible that the location of a company's share listing will determine the return required by its shareholders. This is even the case where the company has multiple listings as one of these will be the primary price-setting listing. So, if this is true, can a company reduce its cost of equity by switching the location of its main listing? Intuitively this seems a nonsense as the company would be investing in the same assets with the same exposure to risks.

However, let us consider the case of Anglo American.

Anglo American plc was formed from the merger in 1999 of Anglo American, a South African mining conglomerate listed on the Johannesburg Stock Exchange and Minorco, a related company holding international mining assets and listed on the Luxembourg Stock Exchange. Anglo American plc has its headquarters and main listing in London.

Nearly all of Anglo American's business is outside the UK, yet are we to believe that its cost of equity is determined by the UK risk free rate and market risk premiums?

In 2004, Investec reckoned that the risk free rate in South Africa was 9.4% compared to 4.8% in the UK and that the Market Risk Premium was 5.5% in South Africa compared to 4% in the UK. So, for the average company, the cost of equity in South Africa would be 14.9% compared to 8.8% in the UK, 6.1% higher. In percentage terms we can say that average expected equity returns in South Africa are 169% of those in the UK. Investec argue that South African companies could reduce their cost of equity by 6.1% just by transferring their listing to London? Can this really be true?

Review Investec Asset Management's report "How has South Africa Inc sought to reduce its high Cost of Capital?"[1] Is there a factor missing from Investec's analysis? They have ignored beta or assumed that it is unchanged. Is this correct? Intuitively we can assume not. In 1999 the Johannesburg market comprised mainly commodity stocks, so Anglo's beta would have been expected to be close to 1. In more developed markets, the betas for commodity stocks tend to be much higher. For example, the European average in January 2012 for Mining & Metals was 1.55. Assuming an Anglo beta of 1.55 in London compared to 1.00 in Johannesburg, the 2004 UK cost of equity figure could be re-stated as 11.00%.

It is also worth considering how Anglo's cash flows are affected by the inflation of the country of operation, the main argument in favour of the selection of the risk free rate. If we look at Anglo's South African operations, clearly the running costs of the operation will be affected by inflation in South Africa, but there is very little correlation between mineral prices and South African inflation. These prices are set by worldwide supply and demand forces. Arguably the US Dollar, the currency of choice for mineral prices, is more influential.

Crucially we also have to convert Anglo's cash flows into Sterling before we can apply the UK discount rate. Its cash flows would be converted into Sterling at the forward rate and, as we

[1] See reading 2.5.1a How has South Africa Inc sought to reduce its high cost of capital?

shall see later in this reading, this conversion eliminates the difference in South African Rand and Sterling interest rates.

It could even be argued that Anglo should not have used the South African Rand risk free rate when it was listed in Johannesburg because its cash flows are so dependent on the US Dollar. Arguably Investec are over-stating Anglo's cost of capital before the transfer to London.

This is not a straightforward area!