significant in all the portfolios (results in table 6.5). In any event, the results are very different to those when considering the Chen, Roll and Ross (1986) factors.

**TABLE 6.5 RESULTS OF US$ GOLD PRICE 1986-1990**

<table>
<thead>
<tr>
<th>PORTFOLIO</th>
<th>INTERCEPT</th>
<th>PARA. EST</th>
<th>T-VALUE</th>
<th>P-LEVEL</th>
<th>ADJ-R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALSI</td>
<td>.01476</td>
<td>.2429084</td>
<td>1.04</td>
<td>0.3030</td>
<td>0.0014</td>
</tr>
<tr>
<td>WEIGHTED</td>
<td>.01261</td>
<td>.4035137</td>
<td>2.11</td>
<td>0.0392</td>
<td>0.0553</td>
</tr>
<tr>
<td>FOUR</td>
<td>.01286</td>
<td>.2327143</td>
<td>1.38</td>
<td>0.1738</td>
<td>0.0503</td>
</tr>
<tr>
<td>FIVE</td>
<td>.0124213</td>
<td>.510693</td>
<td>2.43</td>
<td>0.0180</td>
<td>0.0771</td>
</tr>
<tr>
<td>SIX</td>
<td>.0117236</td>
<td>.3311862</td>
<td>1.51</td>
<td>0.1369</td>
<td>0.0212</td>
</tr>
<tr>
<td>SEVEN</td>
<td>.01346</td>
<td>.545126</td>
<td>2.73</td>
<td>0.0084</td>
<td>0.0984</td>
</tr>
</tbody>
</table>

### 6.4 CONCLUSION

The results of the empirical tests shown do not seem promising. While we are able to argue that the CAPM is not well specified on the JSE, it seems that we are unable to provide a comprehensive theory to replace it. The APT is the most likely successor to the CAPM. The evidence on the JSE shows us that there is more than one factor, yet we cannot specify how many there should be, nor do any of the US (Chen, Roll and Ross 1986) factors seem to significant. Thus we are unable to advocate its general acceptance – we are no closer to establishing the number of factor or their identity than we were when the theory was tested solely on US markets. Nor can the theory in its present form be used to explain market events\(^\text{73}\).

This is unfortunate, as the APT is pleasing in its theoretical simplicity and is intuitively obvious. The major source of difficulty, in my opinion is not the

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\(^{73}\) The derived factor approach can be used to explain market events. A recent example of this approach was the usage by Biger and Page (1993) to evaluate mutual fund performance. This approach was not considered to be within the scope of this paper.
theory per se, but is the lack of statistical tools to estimate the number of factors and identify them. The number of APT articles in the literature has declined in recent years, probably for this reason. The limits of economic and statistical reasoning have been exhausted. In order for the APT to advance, a theoretical or statistical breakthrough is required. It seems that a statistical breakthrough will be of more use than the theoretical. Unfortunately, in the interim, usage of the CAPM will remain (relatively) widespread. The concomitant misallocation of resources will continue.
CHAPTER SEVEN

CONCLUSION

The purpose of this paper was to examine the applicability of the CAPM and the APT to the JSE. In this chapter final comments and thoughts will be offered.

7.1 THE CAPITAL ASSET PRICING MODEL

This theory has $\beta$ as its central proposition. In the final analysis the theory rests on a positive tradeoff between risk and return. Empirical evidence of the CAPM would be a positive SML. As we saw in chapters three and four, it is not possible to find a statistically significant SML, even when using the classic techniques. This in itself indicates that the theory is flawed.

Proponents of the CAPM have argued it is well defined on the JSE, as the anomalies associated with the CAPM are (generally) absent. One of the important "side effect" discoveries of this paper has been to put the Monday effect (on the JSE) to rest. It is however, not enough to argue that the CAPM is valid merely as the anomalies are absent. The theory's central core is either missing, or hidden (the argument that it exists but we cannot detect it). Given the literature that has evolved on the CAPM over the past few years, it seems safe to argue that the CAPM has come to the end of its tether. While its demise has been predicted before and no doubt it will continue to survive for several years to come, in my opinion the writing is on the wall.

What purpose is there in studying the CAPM, apart from an interest in the history of economic thought? Despite its shortcomings, the CAPM does provide us with valuable insights. On the positive side, the CAPM focuses our attention on systematic risk. On the negative side, it shows us how markets do not work, there is obviously more to share returns than $\beta$. It is the failure of the CAPM
that highlights the need for research into the process whereby prices are discovered in the market.

7.2 THE ARBITRAGE PRICING THEORY

One of the reasons for the survival of the CAPM is the failure of its "enemies" to replace it with a workable theory. The APT is the most likely candidate. Unfortunately the theory is silent on specifics. While the CAPM only allows for one factor, we at least know what the factor is. There is no central proposition of the APT that can be tested in order to determine whether the theory is valid or not. There are clues and hints as to what is important, but no hard and fast rules. From chapters five and six it is apparent that the techniques for estimating factor structures are not reliable, as such it is difficult to say much more about the theory as it becomes untestable. The "Roll problem" confounds us in both the CAPM and the APT. We are able to argue that there should be more than one factor describing the risk of securities. We are however unable to say how many there should be. On another note, we were able to say that, at least four of the five US factors are not relevant to the JSE. We have been able to show that the US dollar price has been a significant factor driving the JSE. It must be stated that the APT is years away from being a workable, viable replacement to the CAPM.

7.3 FINAL THOUGHTS

In my opinion the CAPM is not an appropriate model to use on the JSE. The APT is far from operational. Until we are able to operationalise the APT, no reliance should be made upon it. Unfortunately, this leaves us with using the CAPM. The need for further research into the area of asset pricing models is crucial. These theories are not only used for academic purposes, but resources in the economy are often allocated and directed on the basis of these approaches.
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