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What Is the Federal Reserve Banks' Imputed Cost of Equity Capital?

The Federal Reserve System is an important participant in the nation's payments system, which is the infrastructure used for transmitting and settling payments between individuals, firms, and government entities. For example, as reported in the Federal Reserve System's 2004 annual report, the twelve Federal Reserve Banks processed about 16 billion checks, or about 45%, of the 37 billion checks written in 2003. In addition, the Federal Reserve provides fully electronic payments services, such as automated clearing house services. Since the Federal Reserve is required to charge fees for these services, they are known collectively as "priced services." Private sector firms, including some large banking organizations, also provide certain of these priced services, such as check processing.

To promote efficiency and competition in the national payments system for these priced services, Congress passed the Monetary Control Act (MCA) of 1980, which requires the Federal Reserve Banks to set fees that, over the long run, recover all the direct and indirect costs of providing those services. In addition, the MCA requires that those fees recover imputed costs, such as taxes and a cost of capital, that would be incurred if the services were provided by a private firm. These imputed costs are known collectively within the Federal Reserve System as the private sector adjustment factor (PSAF).

The methodology underlying the computation of the PSAF is reviewed periodically to ensure that it is appropriate and relevant in light of Reserve Banks' price services activities as well as current accounting standards, finance theory, and regulatory and business practices. Such a review was conducted and changes implemented in 2005 starting with the 2006 PSAF calculations; see Board of Governors (2005). In this *Economic Letter*, we focus specifically on the current decision to set the Reserve Banks' imputed cost of equity equal to that of the over-all stock market. Our research shows that while many other methods exist for calculating this cost

of equity measure, the choice made by the Federal Reserve is quite reasonable.

Previous methodology

A firm's cost of capital is the weighted average of its cost of raising debt financing and the cost of issuing equity to shareholders. However, recent reviews of the PSAF methodology have focused only on how to calculate the cost of equity capital. The previous methodology for calculating the Federal Reserve Banks' imputed cost of equity capital was a simple average of three different estimation methods; see Green et al. (2003) for more details. All three estimation methods assumed that the relevant peer group of firms for the Reserve Banks' priced services business consisted of large, publicly traded bank holding companies (BHCs). These firms historically have been active participants in the payments system, for example, through the retail deposit and checking accounts they commonly provide.

The first method, known as the comparable accounting earnings (CAE) method assumes that a firm's cost of equity capital (COE) is the ratio of the net income generated by its assets to the book value of its equity. In essence, this ratio gauges the value generated by the firm's equity and sets that ratio as the COE at which the firm could fund itself in the equity markets. An important shortcoming of the CAE method is that it relies on purely historical accounting data, which makes it "backward looking" relative to methods based on market prices.

The second method is known as the discounted cashflow (DCF) method, which is based on the insight that today's stock price equals the present discounted value of a firm's expected future dividends. Forecasts of near-term dividends and long-term dividend growth rates are commonly generated by equity analysts and were used in generating this measure. For the PSAF calculations, these COE measures were calculated for the peer

group BHCs and then weighted according to their market capitalization to generate the sample's COE.

The third method is derived from the well-known capital asset pricing model (CAPM) commonly used for analyzing stock returns. This method is forward-looking since it is based on stock market prices, which incorporate equity investors' expectations of firms' future earnings. The intuition behind this method is that a firm's COE should equal the sum of the return that it provides relative to a diversified stock portfolio, such as the entire stock market, and the risk-free rate of return, usually the Treasury rate. For this method, a stock portfolio consisting of the peer group BHCs' stocks weighted according to their market capitalizations at the end of a year is constructed. This portfolio's historical correlation with the overall stock market, commonly known as the portfolio's beta parameter, is estimated. The peer group's COE is then calculated as the sum of the risk-free Treasury rate plus the product of the portfolio beta and the overall stock market's historical equity premium (i.e., the market return minus the risk-free Treasury rate).

The question of which method is "correct" for the purposes of the Federal Reserve's payments services is difficult, if not impossible, to answer definitively. All of these approaches are models that simplify reality and hence are incomplete in some way. In certain cases, the accuracy of competing models can be gauged with respect to observable outcomes. However, since the cost of equity capital for the Federal Reserve's payments services cannot be directly observed, clear quality judgements among the three methods were not possible. In light of this difficulty, Green et al. (2003) included all of the measures in their proposed COE calculation by taking a simple average of the three, which is a common practice in the academic and practitioner literature on combining multiple possible responses.

Current methodology

The PSAF review process conducted in 2005 examined several elements of the methodology and reached two key conclusions that were adopted into the methodology starting with the 2006 calculations. First, it was decided to use only the CAPM model in the COE calculations, as this model is the one most widely used in financial practice; see Graham and Harvey (2001) for a survey.

Second, it was decided that it had become too challenging to choose an appropriate peer group for estimating the beta parameter needed for the CAPM estimates, because BHCs have expanded into businesses less related to payments services. Therefore, the Federal Reserve chose not to select a group of BHCs as peers but instead to compare itself to all publicly traded firms. This choice was implemented assuming that the beta for the Reserve Banks' priced services is simply one—that is, identical to the broad stock market return. The reasons given for this assumption are that it is simple to understand, administer, and monitor, while it provides reasonable results from a comparative and historical perspective.

Alternative estimation methodologies

At first glance, it might seem questionable to assume that the Federal Reserve Banks' beta is simply equal to the broad stock market return. For example, by collecting enough additional information, it might be possible to measure the beta more precisely. Indeed, academic researchers have suggested a variety of approaches that attempt to take advantage of such additional information. Barnes and Lopez (2006) explore this issue by examining the impact of several of these methods on the Federal Reserve Banks' COE estimates, three of which are highlighted here.

In the first alternative, the authors examined several peer groups, from the broadest BHC peer group previously used (namely, the top 50 publicly traded BHCs sorted by total deposits) to a narrow set of four BHCs that specialize in payments services (although not exactly the same services as the Reserve Banks). Using simple regression analyses, the authors found that crafting smaller and potentially more focused BHC peer groups did not generate beta and COE estimates that were significantly different from the broadest peer group. Hence, incorporating this additional peer group information does not enhance the COE estimates.

The second alternative incorporated additional BHC information directly into the CAPM model, specifically the revenues generated by their payments services as a share of total BHC revenues. Payments revenues are not a clearly defined accounting category, so the authors used the definitions proposed by Radecki (1999) as well as by Rice and Stanton (2003). These definitions focused on service charges on deposit accounts (such as

overdraft fees), interest forgone by customers for access to payments accounts, and credit card revenues related to payments (such as annual fees). In theory, COE estimates for the Reserve Banks' priced services business might be refined by incorporating such information into the CAPM estimation. However, the results suggested that the estimated beta and COE estimates were not materially different from those ignoring payments revenues. Again, additional, potentially useful information was found empirically not to be useful for this application.

The third alternative incorporated the peer group's leverage ratio into the beta and COE estimates. The leverage ratio for the peer group BHCs was defined as the book value ratio of total debt (excluding deposits) to total equity. Finance theory argues that beta estimates should reflect leverage, because the stock prices of more leveraged firms should be more sensitive to overall market fluctuations. In their empirical work, the authors found that accounting for leverage again did not generate COE estimates that were statistically different from those that ignored this information.

In summary, Barnes and Lopez (2006) showed empirically that many potential refinements of the standard CAPM estimation method for COE estimates do not add value for the PSAF calculations. They found that a standard implementation of the benchmark CAPM model using a large BHC peer group provides a reasonable COE estimate, which is needed to impute costs and set prices for the Reserve Banks' payments business. Since the average beta calculated in this way over the years 1981 to 2003 is 1.06, setting the relevant CAPM beta to one seems to be a reasonable choice.

Conclusion

The academic literature clearly shows that estimating a firm's cost of equity capital is a difficult theoretical and empirical challenge. However, such estimates are required for a number of operational processes

and decisions by firms. The case of interest here is the Federal Reserve Banks' need for an imputed COE estimate for their priced services business to meet the requirements of the Monetary Control Act. Recent research suggests that the Federal Reserve's decision to set the COE estimate equal to that of the overall equity market (that is, to set their beta equal to one) is a reasonable and simple solution to this challenging problem.

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