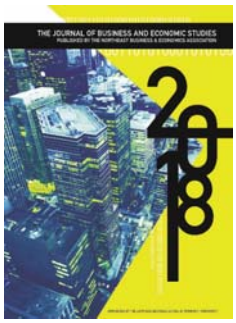

A Case for using a Real Asset Transaction Approach for Estimating the Cost of Capital from Rural Telephone Company Data

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Abstract

This paper develops a real asset transaction approach for estimating the cost of capital for rural telephone companies whose financial assets are not publicly traded. The transaction approach uses the actual purchase prices of rural local exchange carriers (RLECs)' properties and cash flows for estimating the rate of return required by buyers and sellers of RLEC properties. The transaction approach produces higher cost of capital estimates than a traditional approach using a weighted average of debt and equity costs of proxy companies traded on organized exchanges. The estimated difference is in line with the risk premium estimated for small non-traded companies estimated by Duff and Phelps Ibbotson.

Keywords: Cost of Capital, Rate of Return, Telecommunications

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Rural local exchange carriers (RLECs) provide traditional telephone and higher capacity services. As of January 2014, there were approximately 3.4 million access lines provisioned by members in the National Exchange Carrier Association's (NECA) Traffic Sensitive (TS) Pool. The 1,072 TS Pool members serve a small percentage of total U.S. households (3.3 percent), but their service territories cover 41 percent of total U.S. land mass, or over 1.4 million square miles (NECA, 2014, p.4).

Because they operate in sparsely populated service territories, these companies are too small to be supported by local retail customers. The Federal Communications Commission (FCC) documented that "in rural America Universal Service Funding (USF) and Intercarrier Compensation [payments from long distance carriers to complete calls over local networks] represent a significant portion of revenues for some of the smallest carriers—i.e., 60% or more of their regulated revenues" (FCC, 2010, p.140). Further, "In 2009, approximately $2 billion went to 814 rate-of-return carriers" (FCC, 2010, p.157).

The level of support is part of the nation's commitment to provide universal telephone service and now broadband service. Broadband is in the words of the FCC "the great infrastructure challenge of the early 21st century" (FCC, 2010, p. xi). In early 2009, Congress directed the FCC to develop a National Broadband Plan to ensure every American has "access to broadband capability" (FCC, 2010, p. xi).

Rate of return regulation is part of the overall strategy to provide universal service. Under rate of return regulation, the regulator sets an authorized rate of return to compensate investors for risks they incur. The return is earned on "specified investment in plant and useful in the efficient provision of certain interstate telecommunications services" (Wireline Competition Bureau, 2013, p. i). To attract new financial capital, the rate of return needs to be set at or above the cost of capital of an investment opportunity. Estimating the cost of capital is a difficult task, especially for most privately held RLECs whose debt and equity are not traded on open markets.

One contribution of this paper is to contrast traditional methods employed by the FCC for estimating cost of capital, which rely on estimates based on the cost of debt and equity of proxy companies whose securities are traded publicly, with an alternative approach that relies on the purchase price of RLEC assets and free cash flows from operations. The real asset transaction approach is akin to a standard cash flow multiple technique used to evaluate business investments. The dataset used in this study was gathered from actual transaction prices of rural lines and actual free cash flows. We show that the asset transaction approach yields higher cost of capital estimates than the FCC's approach.

Another contribution of the paper is to lend support to the finding that investors expect a large risk premium for investing in small companies whose debt and equity are not traded on organized exchanges.

The paper is organized as follows: The next section summarizes the FCC's method for estimating the cost of capital from proxy companies whose securities are traded on organized exchanges. Next, we describe the free cash flow method for estimating the cost of capital from actual cash flows and purchase prices of rural telephone lines. Then we provide a rationale for the

free cash flow method. Next, we provide cost of capital estimates using the free cash flow methods. We then discuss possible sample biases and show they are not likely to be important. Finally, we compare the real transaction cost of capital estimates to the FCC's with the non-traded risk premium estimated by Duff & Phelps.

The Financial Method used by the FCC

In 2013 the FCC used traditional financial methods to estimate the cost of capital for RLECs. In its report (Wireline Competition Bureau, 2013), the FCC was obliged to base its estimates on a weighted average cost of capital (WACC) method defined in Part 65 (Interstate Rate of Return Prescription Procedures and Methodologies) of the Commission's rules.

The report acknowledged the difficulty of computing estimates for a group of small, rural companies most of which do not have debt or equity traded in open markets. A small sample of proxy companies was used instead, which included large companies like AT&T and Verizon. It also included Fairpoint, which had undergone a bankruptcy proceeding. In addition, many of the companies in the sample derived most of their revenues from non-regulated services while the cost of capital estimate was for regulated services. Non-regulated services include cable television, Internet service, data storage, cloud computing, and wireless services. They are not subject to price regulation or an authorized rate of return.

The FCC also recognized that the timing of its analysis could be questioned. The financial market was probably not in equilibrium as a result of the Great Recession of 2008. In such a risky environment, relative shares of debt and equity used to calculate WACC may not be correct. Market interest rates were likely abnormally low because of depressed economic conditions and the Federal Reserve's lax monetary policy. No adjustments were made for other factors that affect debt and equity shares, even though the report recognized that credit rationing was widespread and even under normal conditions the cost of debt depends on maturity, fixed versus variable rates, seniority, and call-ability. In some cases, when companies are not in good financial health, they may no longer even have access to debt financing.

Other challenges the FCC acknowledged were related to data shortcomings. The discounted cash flow approach (DCF) depends on forecasts of dividends, and the Commission noted that these tend to be overstated by analysts. They also stated, "there is compelling evidence that it [CAPM] does not accurately predict equity returns" (Wireline Competition Bureau, 2013, para. 61).

While the report recognized all these theoretical weaknesses, it concluded that "a zone of reasonable WACC estimates [range] from 7.39 percent to 8.72 percent" (Wireline Competition Bureau, 2013, para. 118).

The FCF Method

The shortcomings of the traditional approach lend support to exploring an alternative methodology based on the purchase and sale of RLEC assets and the free cash flows (FCF) of companies associated with these transactions. The FCF approach is described in standard textbooks, including McKinsey and Company, Inc., Koller, Goedhart, & Wessels (2005). Page 62 describes the "well-known cash flow perpetuity formula":

$$\text{Value} = FCF_{t+1}/(WACC - g)$$

According to the authors, "this formula is well established in the finance and mathematics literature" (McKinsey & Company, Inc., et al, p. 62)

The FCF method is one variant of a ratio multiples evaluation of asset purchases. Other methods may use ratios based on Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) or Operating Income before Interest, Depreciation, and Amortization (OIBDA). Unlike other ratio multiples, FCF recognizes that investment in plant and equipment is necessary if RLECs are to meet their carrier of last resort obligations, which require carriers to serve all customers when economically feasible.

Since the sales price for a company's assets is in effect the value of the firm as perceived by the investor, we can solve for WACC without explicitly requiring market value estimates of debt and equity. The WACC used by the investor to value an RLEC will be based on a weighted cost of debt and equity (Ross, Westerfield, & Jordan, 2015, p. 480). The FCF approach, therefore, avoids estimating explicitly the cost of debt and equity as well as the target capital structure weights.

Rationale for the FCF Method

Even though most RLEC companies are not listed on organized financial exchanges, their properties are being traded; basic details of such sales including sales price and cash flow multiples are sometimes available. It is reasonable to suppose that potential buyers of RLEC properties have a sophisticated understanding of RLEC market conditions. They will consider that a typical RLEC operates in small rural markets, which have both high-cost and low-cost areas, and that it has fewer diversified lines of business than the product portfolios of larger telecommunication carriers. They expect an RLEC will face competition in its low-cost areas but will be required to serve all customers throughout its serving territory regardless of cost due to carrier of last resort obligations. Besides the threat of losing low-cost customers, having less diversified business portfolios and geographically smaller markets, the typical RLEC also faces large regulatory uncertainty. In fact, NTCA found that 80 percent of their members cited regulatory uncertainty as one of the barriers to fiber deployment (NTCA, 2014).

Potential buyers will also consider the risk associated with availability of credit mainly coming from the U.S. Department of Agriculture's Rural Utilities Service (RUS). Many lenders are reluctant to use RLEC network assets as collateral because of the limited aftermarket for such specialized equipment and plant. Government support is necessary to build a business case for

operating in these territories. The threat of loss of regulatory support and the threat of increased competition raise the likelihood of RLECs' financial distress. In addition to eliminating support in areas with competition, the FCC's intent to keep existing high-cost universal service fund (USF) support at current levels, has imposed new constraints on individual components of existing programs, and is attempting to move RLECs away from rate-of-return regulation. The FCC is also gradually shifting universal service funding away from RLECs to unserved regions in non-RLEC territories and to mobile providers (Glass, Stefanova, & Prinzivalli, 2012).

Potential buyers will certainly recognize that large and publicly traded companies face different risks from RLECs, and therefore, will not treat them as comparable investment vehicles. Larger telecommunication carriers' business portfolios include a diverse set of services, serving areas and customers. Their broad diversification greatly reduces business, financial and regulatory risks, which are more difficult for RLECs to manage.

The required rate of return for purchasing an RLEC must account for all the risks associated with its operation. We explore these risks in the following sections and find that the authorized rate of return of 11.25% at the time of the analysis may have been conservative.

FCF Cost of Capital Estimates

We use the FCF method to quantify an investor's required rate of return.

Rearranging terms in the cash flow perpetuity formula described above and assuming growth or g is equal to 0, yields the following formula for WACC:

$$\text{WACC} = \text{FCF}/\text{Value}$$

Analysis of yearly revenue requirement growth of NECA revenue pool members showed that the three-year average of g is 0.01%. Revenue requirement is a cash flow that recovers operating expenses, depreciation and a return on net plant. Given the uncertainty in the environment, this is our best guess of the future level of g. Since the predicted g has a negligible impact on the calculations, it can be ignored when using the formula to derive WACC. This prediction is not crucial to the analysis because the analysis depends on simulating likely future elements of the formula. We could have allowed g or Value, or both to vary as a means of computing a range of WACCs. For simplicity, we allowed Value to vary. In general, FCC regulations suggest g is likely to remain close to zero in the near-term because cash flows must be adequate to finance existing operations. When demand declines, rates are raised to offset the revenue loss. In the aggregate, g will remain close to zero.

To decide what price per line to use for calculating value we used a unique dataset obtained from JSI Capital Advisors on purchased telephone company properties from 2001 to 2011. The data for 1996 to 2000 was added from Legg Mason Equity Research Industry Analysis. Figure 1 below shows the range and weighted average per line prices between 1996 and 2011. The average price per line has been declining from $3,400 in 1996 to $1,060 in 2011. The number of sales also dropped significantly from 18 in 1996 to 1 in 2011.

Rather than trying to pick a specific price and address all issues around which sale is most representative, we used several prices to develop a range of estimates. Average sales prices for local exchange carriers' properties in the last four years of the series suggest a price in the $1,000 to $2,300 per line range. The most recent purchase prices in our data series, among which is the lowest price in the range, were based on a single transaction per year, so we used a more conservative range of $1,200 to $2,400 price per line range to produce our cost of capital estimates.

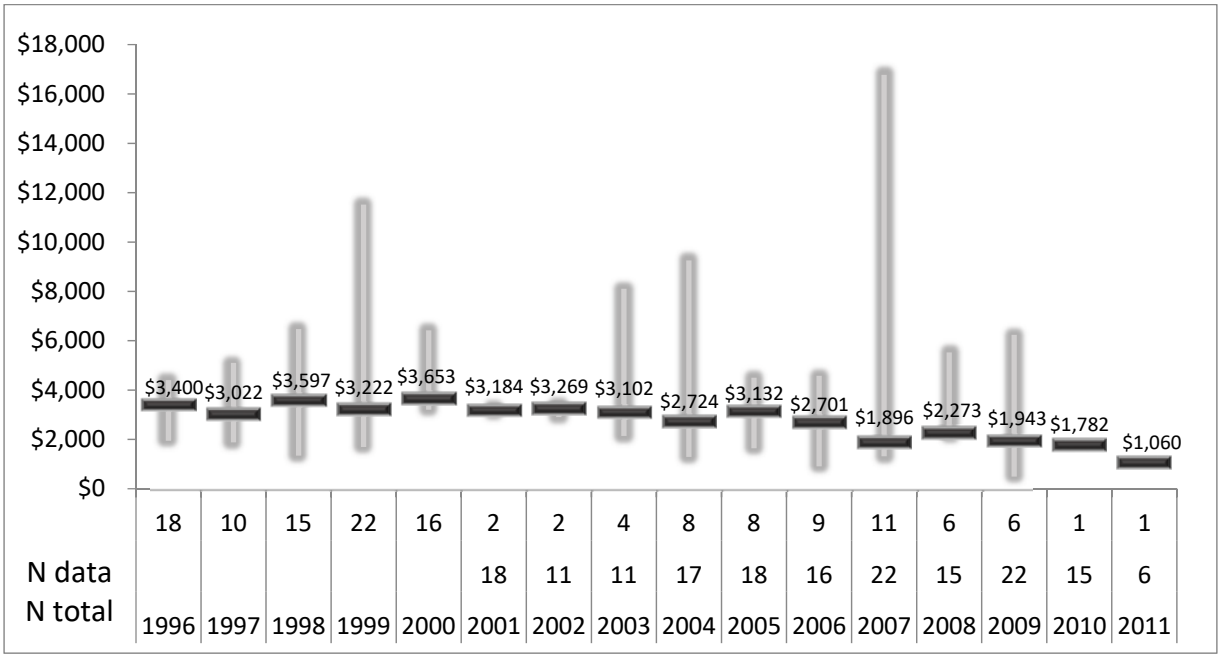


Figure 1: High, Low and Weighted Average Price per Line for Sales of LEC Properties
Sources: Statistics for 1996 to 2000 from Legg Mason Equity Research Industry Analysis, 2001; Statistics for 2001 to 2011 from data purchased from JSI Capital.

We calculated company specific free cash flow estimates using financial data on regulated revenues, costs and capital expenditures for 2010 from a special data request collected from 633 RLECs. To derive a range of cost of capital estimates we multiplied respondents' lines by several prices per line within the range mentioned above. The large dataset of sample companies used to estimate the free cash flows eliminates company-specific risk caused by unanticipated events specific to a particular study area. To some extent, unanticipated shocks that affect all study areas in 2010 are eliminated because the FCF and sales price information cover the 2010-time period. In other words, these shocks equally affect the numerator and denominator of the FCF/V ratio. Because there are large outliers in the data, we report median values of the calculated cost of capital estimates for the sample companies.

As a generic example of the calculation, a company with a free cash flow of $525,000 and 1,800 lines would have cost of capital of roughly 12.15%, assuming a purchase price per line of $2,400: $525,000/(1,800*$2,400) ≈ .1215.

The results are shown in Table 1 below.

Price per Line	Cost of Capital (1)	Cost of Capital (2)
$2,400	11.75%	10.34%
$2,100	13.42%	11.82%
$1,800	15.66%	13.79%
$1,500	18.79%	16.55%
$1,200	23.49%	20.68%

Table 1. Median Cost[1] of Capital for Different per Line Purchase Prices

Note: Numbers based on data for 2010 from 633 companies responding to 2011 NECA Broadband Data Request with complete data on regulated revenues, costs and capital expenditures. Cost of Capital (1) defines free cash flow = EBITDA – CAPEX. This is a definition of free cash flow the FCC has described in the Commission's National Broadband Plan (NBP) documentation. See, e.g., NBP Public Notice #19, 24 FCC Rcd 13757 (Free Cash flow equals EBITDA [Earnings before Interest, Taxes, Depreciation and Amortization] minus CapEx.). The second definition of free cash flow (Cost of Capital (2)) is the standard definition which accounts for corporate income tax: Free cash flow = (EBITDA – Depreciation) (1- tax rate) + Depreciation – CAPEX. See Ross et al, p. 480.

The median cost of capital ranges from 11.75% at $2,400 purchase price per line to 23.49% at $1,200 purchase price per line when we omit corporate income tax from the calculation of free cash flow; when we include corporate income tax the returns range from 10.34% to 20.68%. The corporate income tax rate used in the second set of results is 35%. Because the 0% and 35% tax rates bracket the 21% corporate tax rate that became effective on Jan. 1, 2018, results using the 21% tax rate would fall between the two sets of results. All values calculated using the FCF approach proposed in this paper are above the cost of capital estimates calculated using the financial approach in earlier studies and most of our estimates are above the authorized rate of return of 11.25%. Although the cost of capital estimates at the higher end of the range are based on a sparse number of telephone company sales after 2009 (Figure 1), the recent telephone company sales data show that investors' expectations are already higher than 11.25%. Further support for this higher expectation is the observed decline in purchase prices of telephone properties.

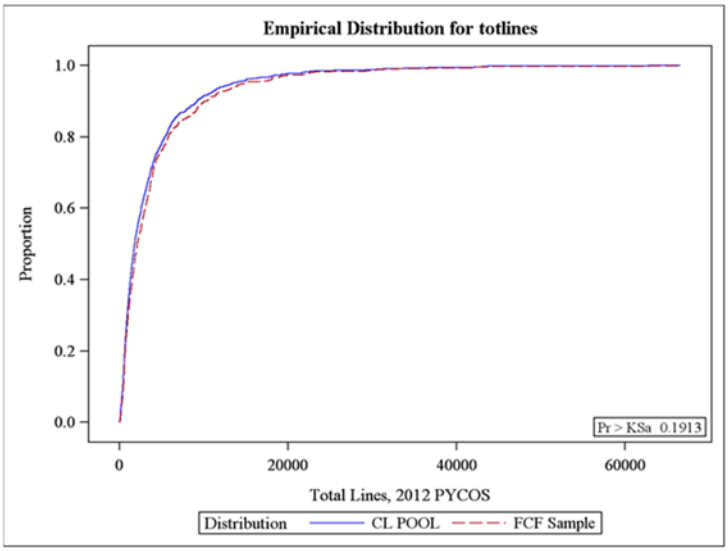
Besides the ability to estimate and compare cost of capital estimates using a different method, the FCF method has some additional practical advantages in this case. We can estimate cost of capital for small, non-publicly traded companies during a period when actual financial markets were distressed and unpredictable. Another advantage of the estimates from the FCF approach comes from exploiting the richness of our dataset. The FCF data are limited only to RLEC regulated activities, for which cost of capital determinations are relevant in prescribing an authorized rate of return. By contrast, estimates based on traditional approaches need to use proxy companies, which may have as little as 10 percent of their overall operations classified as

[1] Medians offer a practical way to summarize cost of capital estimates for the sample as 159 companies reported a negative free cash flow in 2010. Like a price/earnings ratio, the FCF ratio makes little sense as valuation tool when a company is operating at a loss.

incumbent LEC price-regulated interstate telecommunications (Wireline Competition Bureau, 2013, p. 6).

Moreover, the dataset used in our analysis consists of 633 cost and average schedule companies, as opposed to the 16 proxy companies used in the FCC report. Cost companies conduct detailed studies of expenses and investments each year. Average schedule companies receive settlements based on formulas that simulate the disbursements received by similar cost companies.

To test whether the FCF sample is representative of the NECA common line pool, which includes virtually all RLECs, we plotted the line size distribution of the common line pool and overlaid it with the line size distribution of the FCF sample. As Figure 2 shows, the two distributions are very similar, which is further supported by a statistical test. The Kolmogorov-Smirnov two-sample test had a p value of 0.19, indicating the null hypothesis of identical line size distributions in the FCF sample and the common line pool could not be rejected.



CL Pool: NECA Common Line Pool.
FCF Sample: Sample of companies used in FCF analysis.

Figure 2. Cumulative line size distributions of the NECA common line pool and FCF sample.

Among the most recent transactions, the only telephone company sale that does not include a large fraction of non-regulated services had a price of $1,060 per line. This transaction price is well below the midpoint value of $1,800 shown in Table 1, and even less than the $1,200 at the low end of the range we used, suggesting the value of RLEC lines continues to drop. In the JSI Capital database, recent transaction prices are based on connections which include ILEC and Competitive Local Exchange Carriers (CLEC) access lines, DSL and high-speed subscribers and video subscribers. Since cost of capital estimates using the FCF method increase as per-line prices decrease, it is clear that the line sales price range used for our analysis provides a conservative view of recent market valuations and WACC for RLECs.

After completing the first set of cost of capital estimates, we gathered additional data as an ex-post check on our estimates. Figure 3 below displays the data supplied for all rural sales transactions, whether related to regulated services or a broader class including non-regulated services. It is interesting to note that recent sales, whether they include non-regulated services or not, have per connection prices below $1800 per connection. Besides the price decline, it is also apparent that the number of sales transactions has drifted downward over time, especially in the last two years reported, 2011 and 2012. The lack of more recent sales transactions strongly suggests the market is in paralysis: buyers and sellers cannot agree on prices, and rural properties are becoming increasingly illiquid, which should also drive up the return required by an investor. This could also be the result of the credit crunch after 2008, which made raising funds to purchase RLECs difficult. In this case, the explicit cost of debt does not account for rationing of borrowed funds, which effectively raises the cost of debt.

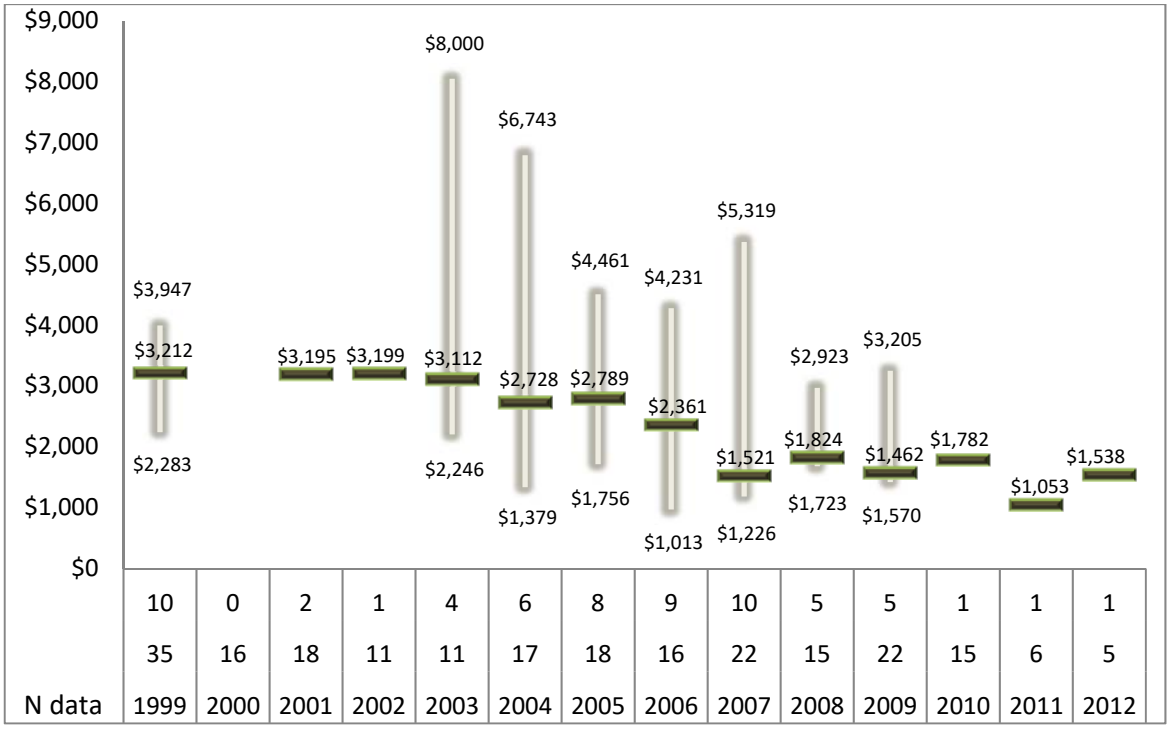


Figure 3. High, low and weighted average price per connection paid for observed RLEC property transactions.

Notes:

1. Data extracted from JSI Capital table of observed deals.
2. Chart shows observed deals with available price per connection. Number of deals used is indicated by *N data*. *N total* counts the number of total deals reported in the JSI Capital table for each year. Transactions are counted within a year depending on the transactions' "announce date".
3. Connections include ILEC and CLEC access lines, DSL and high-speed data subscribers and video subscribers.

Other Considerations that may affect Transaction Approach Accuracy

Purchase price may be affected by regional differences in market potential and the balance sheet differences that may point to unusually large debt obligations. The evidence suggests these potential problems with the transaction approach are not important.

Thirty-five percent of the RLECs in NECA's common line pool borrow money from the RUS. The RUS has stringent requirements for borrowing money (Rural Broadband Access Loans and Loan Guarantees, 2015). Loan applicants must demonstrate an equity contribution of at least 10 percent of the loan amount requested for a project. They must also demonstrate their operation will achieve a Times Interest Earned Ratio of at least 1.25 by the end of a five-year forecast period. The Times Interest Earned Ratio (TIER) is the ratio of the applicant's net income after taxes plus interest expense, divided by interest expense that includes existing interest plus interest in the proposed loan. Applicants not meeting the TIER threshold must provide additional capital, cash, or security and/or agree to a change in the loan terms. In addition, borrowers must construct facilities within three years from the time loan funds are available (Rural Broadband Access Loans and Loan Guarantees, 2015). As a result, one would expect the companies being sold have similar balance sheets.

The companies sold are widely dispersed. Table 2 classifies the sales in Figure 3 by Census region. The sales took place in all four Census regions of the country.

Census Region		
Region	*Frequency*	*Percent*
Midwest	118	48.36
South	57	23.36
West	36	14.75
Northeast	29	11.89
Other (U.S. Territory)	4	1.64

Table 2. Location of Telephone Properties Sold by Census Region
Note: Census region for sales that could be classified by state. Multiple states are used when RLEC properties had operations in more than one state.

Risk Premium Revisited

Alexicom Consulting filed a report documenting small company risk premiums based on Morningstar/Ibbotson SBBI Valuation Yearbook and The Duff & Phelps Risk Premium Report. Alexicom concludes that a cost of equity size premium in excess of 6% is warranted for RoR ILECs (In the Matter of Connect America Fund, 2013, pp. 22-23). Dhatt, Kim, and Murkerji (1999) found that a value premium of 5.28-8.40 percent exists for stocks in the Russell 2000 Index in the 1975-97 period. Adding a 6 percent premium to the FCC's 8 percent cost of capital estimate is in line with the real asset transaction approach.

Conclusion

In this paper, we contrast the traditional methods for estimating cost of capital, which rely on estimates of the cost of debt and equity derived from proxy companies whose financial assets are traded on organized exchanges, with a real asset transaction approach, which relies on the purchase price of assets and free cash flows from operations. The real asset transaction approach yields return estimates above the authorized rate of return in effect at the time of the analysis, while the traditional financial approach yields estimates that are below. One could argue that the large discrepancy is due to data problems. However, one could also argue that the large discrepancy lends further proof that cost of capital estimates based on proxy companies traded on organized exchanges is suspect and an 'eclectic approach' is preferable as claimed in Shiller (2003). Using a small-company risk premium appears appropriate.

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