

More Data Frames, Merge and Plotting

R Users Group

Thursday March 16, 2017

Abstract

In this lesson, we will gain some additional practice with data frames and introduce the Article document class in L^AT_EX. We will be working with actual ASRS Private Equity data and will use the merge command to do some portfolio composition analysis. We illustrate how to control the order of factor levels. We use ggplot2 to present the results graphically.

1 The Article Document Class

1.1 The Article Class

The Article class in L^AT_EX is the last type of document we are going to introduce. The good news is that it is probably the easiest of all of them.

Article class is the default in L^yX. So, if you click File/New from the drop-down menus, you will get an Article class document. The only thing you need to do is go to Document/Settings/Modules and add Rnw (knitr) to the installed modules. This will allow you to call R from inside the document just as we did in the Beamer class. The `\Sexpr` command works the same way in Article class as it does in Beamer. Note the use of this technique to insert the date of this document.

We will illustrate the basics of formatting in the Article class in this tutorial. To learn more, go to the Help menu in L^yX. You will find a series of manuals. These manuals are presented as L^yX files. Hit the “eyeballs” to turn them in to a PDF. Then look at them side by side to understand the formatting you get from the L^yX file.

1.2 Floating Figures

When in working on Article, you don’t need to worry about pagination. L^AT_EX manages that for you. You will generally insert graphs or tables in to your report as “floating figures”. Use Insert/float/figure to accomplish this. L^AT_EX will automatically number your figures. You type a name for your figure, move the cursor outside the name box, hit return and then insert a code to incorporate your R code. The procedure incorporating R code from a separate file is identical to what we showed for Beamer. We illustrate floating figures later in this document.

1.3 Recap of document types

Since we are not going to introduce any new document types, now is a good time to recap them. Here are the document types we have learned:

1. R Markdown/R Notebook
 - (a) Use this document type for quick and dirty analysis and informal presentations
 - (b) Formatting options are limited compared to \LaTeX , but you can create a decent looking document
 - (c) If you need to generate an MS-Word file because you are collaborating on a larger where this is the expectation, R Markdown is the way to go.
2. Beamer
 - (a) This is how you generate polished slide presentations
 - (b) Many formatting options
 - (c) Can incorporate images, tables and graphs generated by R
3. Article
 - (a) Generates a polished technical report with figures of graphs and tables.
 - (b) Many formatting options

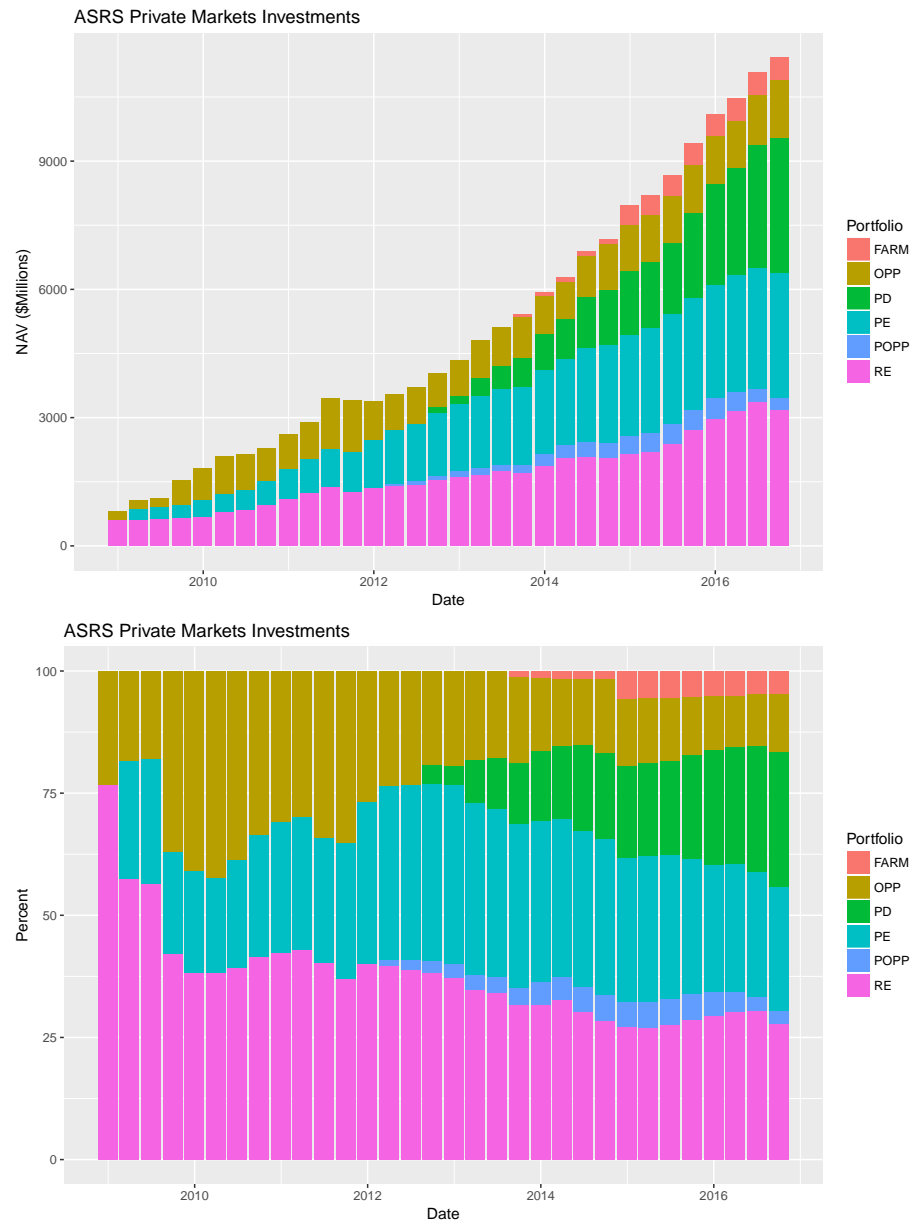
2 Show the growth of the ASRS private markets portfolio

In this figure 1 we illustrate several things. First, this figure is inserted in the document as a floating figure. \LaTeX decides where to place the figure in the document by the space available on the page. Second, we show that you can put two charts on the page aligned vertically by simply placing two charts in the code chunk. Third, we illustrate the use of a label/cross-reference feature. Note the label “byportfolio” inside the floating. I can now refer to that label in subsequent text and it inserts “1” after the word “figure” in the first sentence of this paragraph. This is handy, because if you move things around the figure numbering remains coordinated with you text.

The two graphs here show:

- the growth of the ASRS private markets portfolio in dollar, and
- the composition of that portfolio

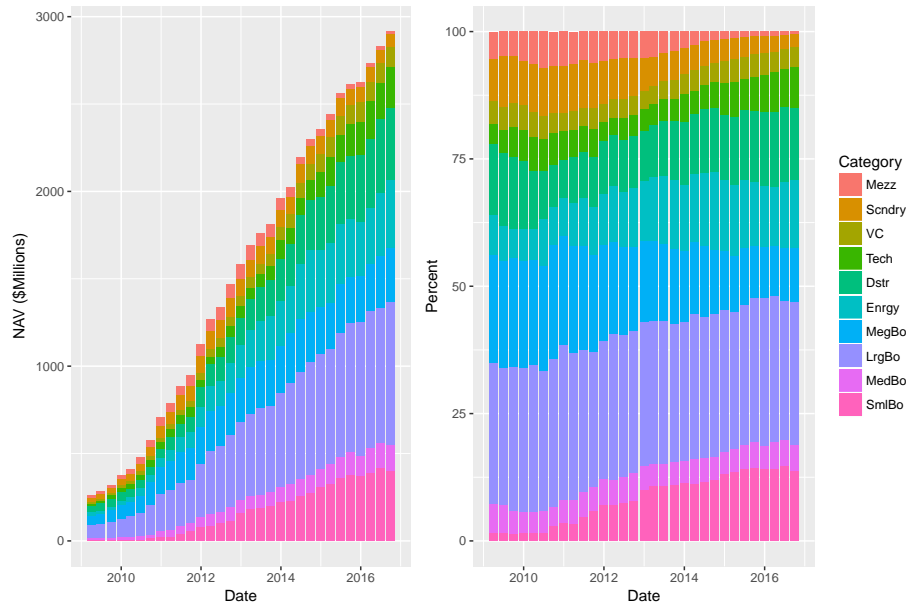
Figure 1: ASRS Private Markets Portfolio



As you can see, the portfolio has grown substantially and has become well diversified across multiple strategies.

Note the use of the “clear page” (insert/formatting/clear page) following this paragraph. This forces the graphics related to this section to appear in this section. Otherwise, it might “float” to a later section.

Figure 2: ASRS PE Portfolio by Category



3 Analyzing the ASRS PE Portfolio

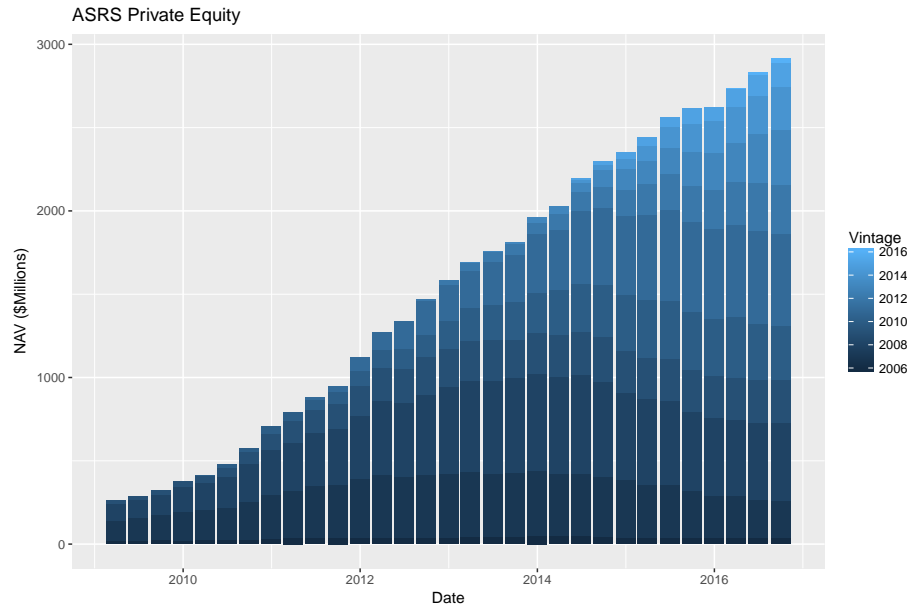
3.1 By Category

Here we show the private equity portfolio by strategy. As you can see, the bulk of the portfolio is held in “buyout” generalists. But a healthy portion of the portfolio is invested with industry or strategy specialists.

I also illustrate here how you plot two graphs side by side using the “gridExtra” package. You need to install this package from RStudio. In the lower right panel, pick packages/install then type “gridExtra” in the dialogue box. Look at the R code carefully here. I used “theme(legend.position. . .)” to eliminate the legend the left graph. I used “widths” in the grid.arrange to balance the width of the graphs with and without legend.

You can decide for yourself which looks better. By the way, there is another way to do this by inserting floats in side the float – check out the User Manual under the help tab. The advantage to this is some additional labeling flexibility. Also, note that I typed this paragraph under the figure float in the LyX file. But that’s not where it ended up in the output. That’s what we mean by “float”.

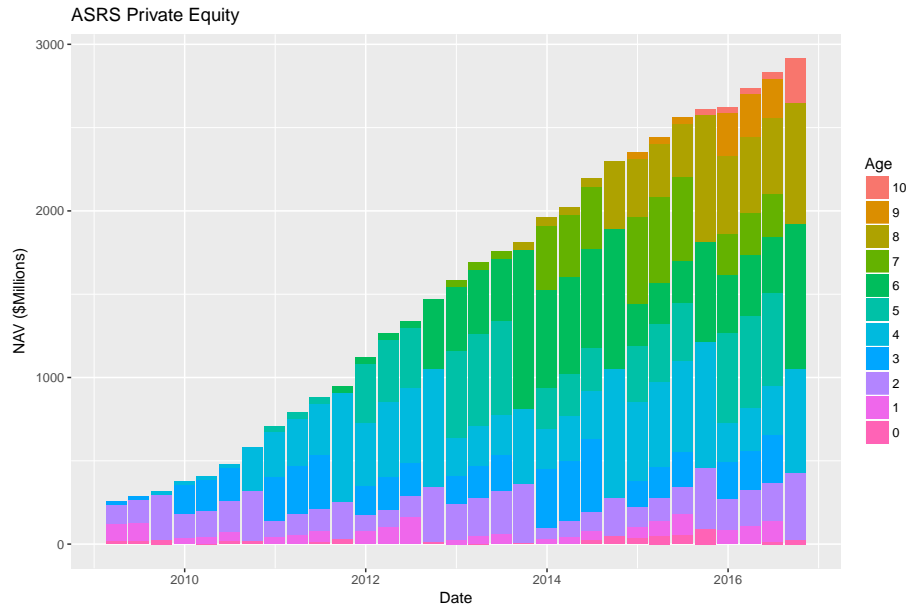
Figure 3: ASRS PE Portfolio by Vintage



3.2 By Vintage

Here we present the portfolio composition by vintage year of the fund. Vintage year is one of the most important determinants of fund performance and always needs to be kept in mind in order to understand performance.

Figure 4: ASRS PE Portfolio by Age



3.3 By Age

Here, we present the portfolio by age. We are analyzing at each point in time, what is the average holding period for the composition of the portfolio. Because we only started private equity within the last ten years, in the early years of this analysis the portfolio is young. This has two implications. In a young portfolio, you will have more “J curve” effect meaning fee drag will be more pronounced in such a portfolio. Secondly, it takes time for private equity management strategies to generate value. So, a young portfolio will tend to have a higher portion of holdings held at cost. As a portfolio matures both of these effects are mitigated. In order to compare the performance of private equity portfolios to peers or benchmarks, you need to pay attention to vintages and average portfolio age to produce a meaningful analysis.

4 Homework

We suggest the following exercises to continue learning R and L^AT_EX

1. Repeat the analysis we did for private equity for the real estate portfolio
2. Convert this presentation with the same graphs to a Beamer deck