

Bonnie B. Boilerhead

Statement of Interest

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John Lovett

Working Title: The Denver and Rio-Grande's Choice of a Narrow Gauge - Prudence or Folly?

Abstract:

When first founded in the early 1870's, the Denver and Rio-Grande Railroad (DRG) adopted a narrow gauge. The DRG has often been criticized for adopting a narrow gauge instead of the wider "standard" gauge. Some have argued that the choice of a narrow gauge prevented the D&RG from becoming a major player among the interregional railroads, and, instead, constrained it to be a local, "mountain" railroad. I propose to further investigate the DR&G's choice of a narrow gauge if my application is funded. Was this choice of narrow gauge really the wrong choice? While it is too early in my research to come to definitive conclusions, it is obvious the narrow gauge decision must be looked both ex ante and ex post.

Ex ante, i.e. based on the information available at the time, there are many reasons why the narrow gauge decision could have been good. Narrow gauge railroads were cheaper to construct. Future, future developments favoring standard gauge, gauge standardization, engine development, traffic patterns, etc. would be hard to predict. Ex post, history has shown us the D&RG became a local road, the "sick man of wall street" after its choice of narrow gauge. Nonetheless, this does not necessarily mean the narrow gauge decision was bad ex post. There are many reasons to believe the D&RG would have ended up both smaller and in deeper financial straits if it has chosen a standard gauge.

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The Denver and Rio-Grande's Choice of a Narrow Gauge - Prudence or Folly?

by Bonnie B. Boilerhead

When first founded in the early 1870's, the Denver and Rio-Grande Railroad (DRG) adopted a narrow gauge. The DRG has often been criticized for adopting a narrow gauge instead of the wider "standard" gauge. Some have argued that the choice of a narrow gauge prevented the D&RG from becoming a major player among the interregional railroads, and, instead, constrained it to be a local, "mountain" railroad. I propose to further investigate the DR&G's choice of a narrow gauge if my application is funded. Was this choice of narrow gauge really the wrong choice? While it is too early in my research to come to definitive conclusions, it is obvious the narrow gauge decision must be looked both ex ante and ex post.

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Introduction

While several western railroads play a major part in Colorado's history, The Denver and Rio Grande Railroad (D&RG) holds a special place in Colorado history. It is Colorado's only home grown major railroad. The D&RG was Colorado's attempt at the major leagues of transcontinental railroads. When General William Jackson Palmer started the D&RG in 1870, he intended it to connect Denver with Mexico City to the South. Connections North and west were also envisioned (Athern. 1977. 11). Yet the D&RG never lived up to its "big league" expectations. Instead of becoming a large interregional railroad like the Union Pacific and Sante Fe, the D&RG, became a small, local "mountain" railroad.

Among the many reasons posited for the D&RG's lack of success is its choice of a narrow gauge. This narrow gauge increased the costs of connecting with what was evolving to be the "standard

gauge”. It also limited engine size and the efficiency of hauling large volumes of freight. But was the narrow gauge decision really a bad one? If this proposal is funded, I will continue my research on this topic. Prior research points the way to several lines of inquiry ...

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Literature Review *(Most students organize their literature review by source. i.e. Most review one source, then move on to their 2nd source, etc. An alternative is to organize the literature review by theme/topic/idea. i.e. One can discuss how each relevant source deals with a certain topic, then move on to another topic, etc. The literature review below is organized by topic ... & I made it up)*

Numerous authors have investigated the choice of railroad gauges during the 19th century in countries throughout the world. The costs and benefits of a particular gauge can be classified into two categories: 1) internal costs and benefits, namely those accruing to a railroad without consideration of connections to other railroads, and 2) connection costs and benefits (Moose. 1999. p 10 – 14). Squirrel (1982), Moose (1999), and Dog (2002) have all investigated the internal costs and benefits. Squirrel, in particular, investigates the limitations of narrow gauge with respect to locomotive size. It was not until the post World War II era that multiple locomotives could be operated as a single unit by a single crew. As a result, the standard (and limiting) unit was a single locomotive during the period railroads were making the choice of a gauge (Squirrel. 1982. pp 17 - 18). A larger gauge meant a larger boiler and therefore a more powerful engine. Both the maximum diameter and length of increased roughly in proportion with the gauge. While one could always use a boiler much smaller than the maximum size, one simply could not exceed the maximum size. The result, according to Squirrel, was that broad gauges could utilize both low power and high power locomotives whereas narrow gauges could only utilize low power locomotives (pp 22 – 27). To support his argument, Squirrel plots the effective horsepower of various locomotives in the United States, ca 1880, against the gauge upon which they ran (p 25). As a result, Squirrel concludes that railroads that adopted a narrow gauge were making a bad decision based on the available evidence.

In contrast, Moose (1999) concentrates on cost per unit of effective horsepower rather than simply the range of horsepower available to a gauge. *Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya. Yaddi –yaddi –ya.*

As mentioned previously, the other category of costs and benefits associated with a gauge are connection costs. Whether or not a particular gauge is best for Railroad X depends on what gauge

Proposed Outline for Final Paper *(This one is a lot longer and more specific than most have at this point. Nonetheless, aim high. Try to have an in-depth outline.)*

I. Introduction

II. Lit Review: The narrow gauge is generally considered a poor choice for the D&RG

- A. The D&RG's narrow gauge hindered it in competing with the AT&SF, U-Pac, etc.
- B. The D&RG's choice of narrow gauge did facilitate service in the mountains
- C. A) and B), namely the D&RG's choice of a narrow gauge caused it to be a local road rather than one of the regional roads
- D. In the long-run, the trans-continental roads were more profitable than the local roads
- E. In the long-run, the D&RG did undertake the expensive process of going to a broader gauge
- F. In sum, the initial choice of a narrow gauge by the D&RG was a poor choice

III. The Choice of a Gauge in 1870: an overview

A. Compatibility questions

- 1. Pre-1870: Compatibility w neighboring lines thought to be unnecessary or even bad
- 2. Post 1870: Compatibility becomes (recognized as) desirable
 - a. more trackage and more traffic \Rightarrow more potential interconnections
 - b. decline of RR's feeding a port model
 - d. freight becomes relatively more important than passenger traffic (i.e. the cargo won't change cars by itself)

B. Questions regarding optimal gauge in isolation

1. Narrow gauges

- a. cheaper to build (cool numbers)
- b. smaller, cheaper locomotives and cars
 - 1. well ... cheaper if the tonnage and traffic is small
 - 2. less efficient if the tonnage and traffic is high
- c. better in the mountains

2. Wide gauges

- a. more expensive track, rails, cars and locomotives
 - 1. well ... more expensive if the tonnage and traffic is small
 - 2. more efficient (low cost) if the tonnage and traffic is high
- b. smoother rides, faster speeds
- c. bigger, more powerful boilers (i.e. engines)
 - 1. Once developed, these would be the lowest cost method of hauling large volumes (one big trains is cheaper than two smaller ones)
 - 2. coupling of engines was quite difficult before diesels

3. But wait! ... What did the future hold ... as viewed from 1870?
 - a. Western traffic volumes were still relatively low, even on the U-Pac
 - b. The large, powerful “big gauge engines” were not yet on line
 - b. experiments with “double boiler” (fore and aft) engines

III. The D&RG's Choice of a Gauge in 1870

A. Compatibility questions

1. no plans to connect with the U-Pac, Kan-Pac or the AT&SF
2. not much with which to connect even if the D&RG wanted to
3. Where did the company want to go?
 - a. not eastern markets (Omaha, Kansas City)
 - b. not the mountains (yet)
 - c. south towards Santa Fe, El Paso, and Mexico and its smaller gauges
4. Don't forget, the time period is still one in which a standard gauge is not yet the ideal or the reality.

B. The question of a gauge in isolation

1. low traffic volumes forecast, especially initially
 - small, cheap cars, tracks, and locomotives best serve this
2. Desire to use iron works in Pueblo
 - low volume relative to eastern mills
3. The book was not yet closed on the “double boiler” experiments.

C. Financial considerations

1. severely undercapitalized relative to planned trackage
2. no income source yet

IV. Conclusion

A. Was the choice of a narrow gauge bad, ex ante?

1. ex ante: before the fact, i.e. given what the company knew in 1870
2. The choice of a narrow gauge likely made sense, ex ante, regardless of financing, given the D&RG's goals and projected traffic patterns. I'll have a more definite conclusion based on further research.
3. Given the company's financial constraints, a narrow gauge may have been the only hope of reaching its goals

B. Was the choice of a narrow gauge bad, ex post?

1. Given the company's financial constraints perhaps the choice was narrow gauge or no railroad, rather than narrow or broad gauge.

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Yaddi –yaddi –ya.

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