Benchmarking of rail firms has become a matter of substantial interest and many authors have emphasised the importance of transaction costs in regard to assessing the desirability of vertical separation. However, due to data and methodological limitations transaction cost elements have never been explicitly subject to efficiency analysis. This paper builds on recent results in regard to transaction cost measurement (e.g. Merkert, 2008) and uses physical indicators of transaction costs in bootstrapped data envelopment analysis (DEA) to evaluate relative technical efficiency and economies of scale of 43 Swedish, German and British train operating firms. This is followed by a second-step Tobit regression model while controlling for institutional (vertical separation and type of operation), environmental (competition) and transactional (monetary values of transaction costs) factors. The results of the analysis show that the relative level of transaction costs has the most significant effect on technical efficiency.