A combined “classification-then-regression” machine learning model can avoid the public health and economic costs associated with delayed deliveries of HIV medicines. An ensemble classification algorithm, Extra Trees, is able to detect **1 in 2** delayed item deliveries. This is a significant improvement from a null hypothesis model which would detect only **1 in 9** delayed items and a considerable improvement from benchmarked Random Forest classification algorithm which catches **1 in 3** delayed items. Once delayed items are identified, an Extra Trees regression algorithm can predict the length of delay to within **12 days** (RMSE) with an R-Squared of **0.86**, which is similar to the benchmarked Random Forest regression performance. So, while there was no significant improvement in the regression part, the combined classification-then-regression model for Extra Trees does significantly better than the benchmark.