Outliers are a fact of life in business surveys. Their effect on population level estimates is well known, and various outlier-robust estimation methods (e.g. winsorization) are in use in business surveys. When small domain (e.g. fine level industry classes) estimates are required, the impact of these outliers can be magnified considerably, and simple domain-level versions of these population level robust estimation methods may be inappropriate. Outlier-robust prediction methods have been developed within the small area estimation literature, and can be adapted to this situation. However, these methods are complex to implement, and tend to be numerically unstable. In this paper we describe a simple bounded bootstrap approach to small domain inference that overcomes these problems. In particular, we show how this approach can be used to deal with the bias that arises when a mixed effects linear working model is used for small domain inference and there are asymmetric outliers in the sample data. We propose two robust bias-corrected outlier robust estimators based on a robust random effect block bootstrap, one involving a post-bootstrap bias correction and the other a within-bootstrap bias correction. We also show how this approach can be used to define an outlier robust predictor of the domain-specific empirical distribution function, opening up the possibility of a general outlier robust approach to small domain predictive inference. Finally, we provide results from a model-based simulation study that serves to illustrate the performance and relative efficiency of the proposed bootstrap-based methods.