The expansion of the national airspace system (NAS) has driven a continued assessment of the external costs of aviation. Of particular concern are noise externalities. At levels above 55 db Day Night Level (DNL), a measurement of noise over a 24hr period that weights events during primary sleeping times, noise becomes an increasingly important and detrimental aspect of the environment [1]. Noise affects communities through various interlinked pathways causing annoyance, sleep deprivation and interruption, learning disruption, and cardiopulmonary health effects [2]. One policy approach to mitigating the effects of aircraft noise is the implementation of noise insulation and land acquisition policies at airports.

The contribution of this paper is to quantitatively assess the costs and benefits of housing insulation and property acquisition policies as they have been applied at US airports. Previous research on aviation noise policies has focused on methodological issues and qualitative comparisons or has not specifically examined the role of land-use management policies. Girvin (2009) [3] presents a qualitative assessment of noise mitigation policies, but does not directly assess the costs or benefits from these land use change policies. Other studies have examined the costs and/or benefits of alternative policy instruments including mandatory aircraft retirement [5], airport noise limits [6], certification stringency [7], and noise taxes and fees [7,8]. Mahashabe et al. [9] examine the co-benefits and tradeoffs to noise of an emissions-based policy and its impact on net policy benefits. However, a rigorous assessment of land-use policies and their net impact on social welfare has not been accomplished.

We examine land-use management at 15 US airports. We use the FAA Airport Improvement Program (AIP) grant histories to determine the costs of these programs as a function of the number of people impacted. We use a Willingness-to-Pay for noise abatement based on a meta-study of hedonic pricing surveys to compute the benefits of these improvements from changes in housing values. Utilizing exposure-response relationships from literature [10] we also compute the costs of aviation noise induced hypertension and myocardial infarction. We use these costs to estimate the bounds of the social welfare benefits of land-use policies. Finally,
we assess the costs and benefits of land-use management through traditional policy perspectives such as Cost-Benefit and Cost-Effectiveness and compare the results to other policy instruments.

We find that the average cost for home insulation across all noise projects considered is $11,800 per person affected, and the average cost for property acquisition is $45,300 per person affected. Utilizing results from He et al. (2014), we find a linear relationship between Willingness-to-Pay for abatement near an airport and city-wide income level. We find that at an average income level of $40,000, per person benefits of noise mitigation policies range from $0 per person at 0 dB removed to $19,000 at 35 dB removed ($16,000 - $21,000 5th and 95th percentile range). At 20 dB DNL effectively avoided at income levels over $40,000 a year or at 16 dB DNL avoided at an income level of $60,000 a year, the cost of insulation is covered by the social welfare benefits to the residents affected. For income levels up to $40,000, welfare benefits measured from housing values never exceed the cost of land acquisition projects for the range of dB levels considered. The mean expected health costs of aviation noise from hypertension and myocardial infarction are 15%-18% of the housing value impacts using a Value of Life Years lost (VOLY) approach and 37-40% of the housing impact using a uniform Value of Statistical Life (VSL) recommended by the EPA.