



United States Department of Agriculture  
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# The Drivers of and Barriers to Residential Solar Adoption

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## Background

- The adoption of residential solar technology is critical given its potential to reduce the production of greenhouse gasses and their detrimental environmental effects.
- Residential solar adoption has grown significantly, reaching 19 GW nationally in 2020, enough to power about 3.6 million homes
- The Biden Administration aims achieve carbon free electricity production by 2035, and net zero carbon emissions from the economy by 2050.

## Objective

This research seeks to determine the drivers of and barriers to residential solar adoption, and how these factors differ among solar owners and lessees, in order to better inform incentive programs and renewable energy policy.

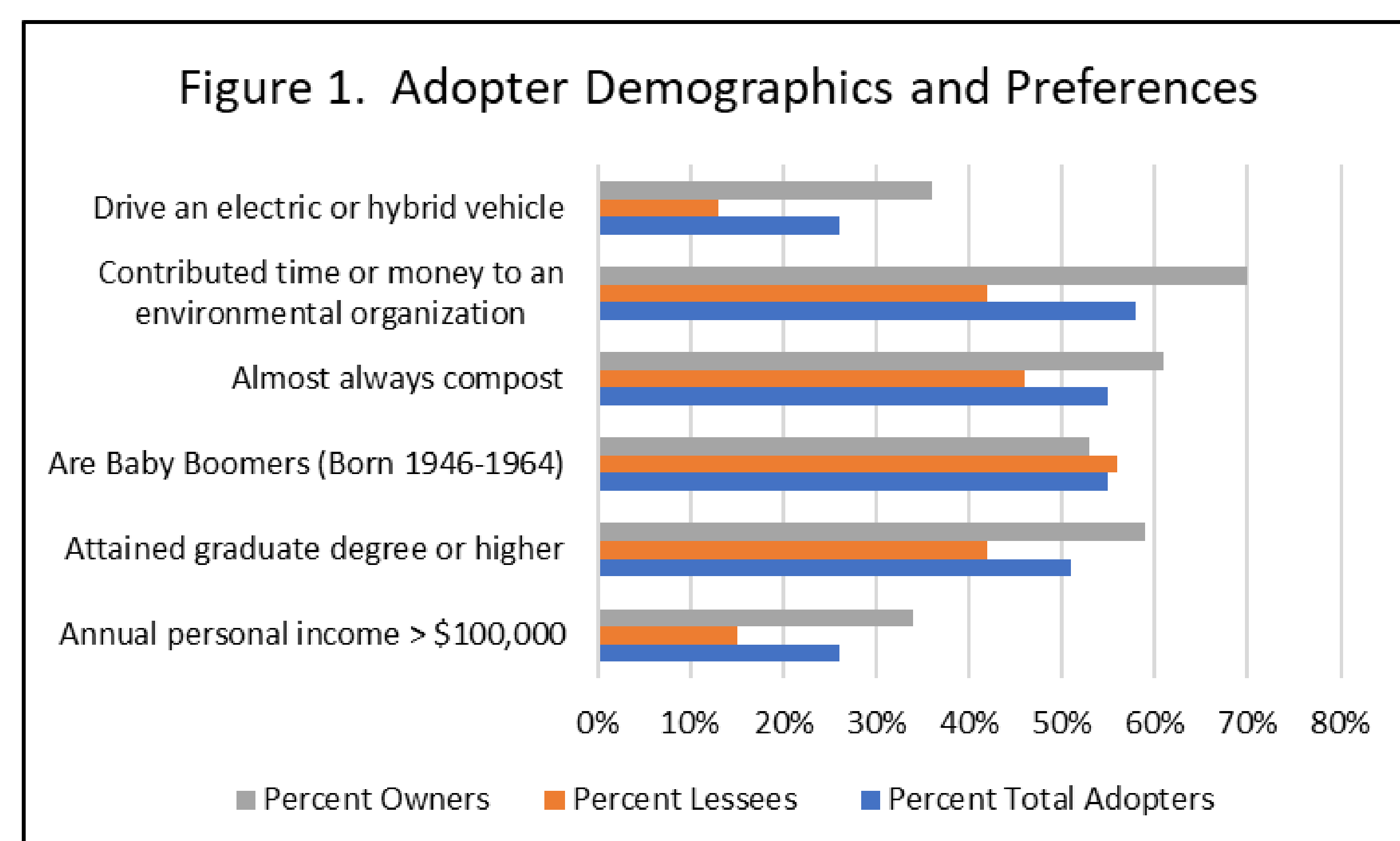
## Methodology

- A literature review of relevant articles published since 2000 was completed to determine the key adoption factors for residential solar technology.
- Secondary analysis was conducted using Massachusetts survey data of solar owners and lessees to further explore these factors.

## Results

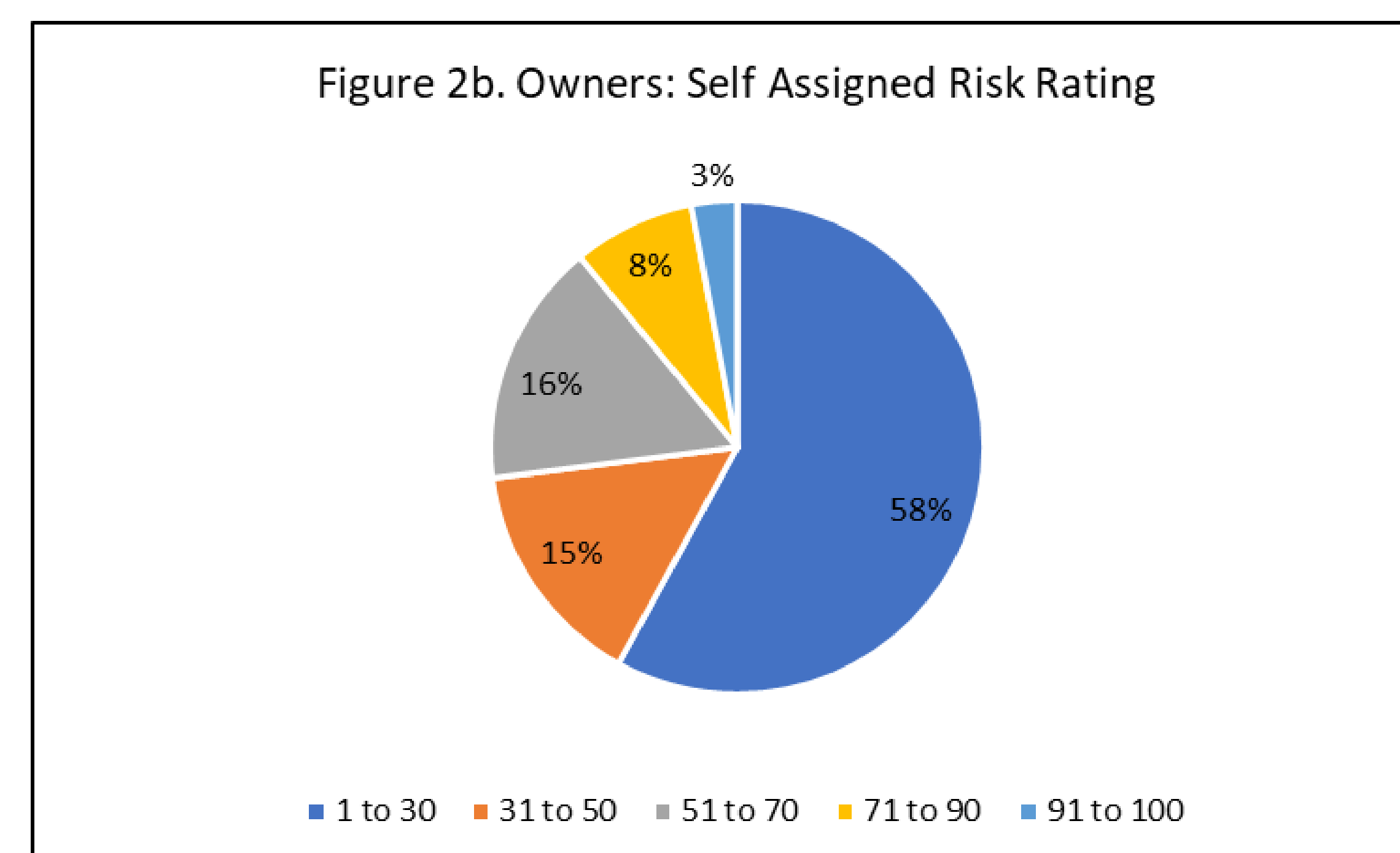
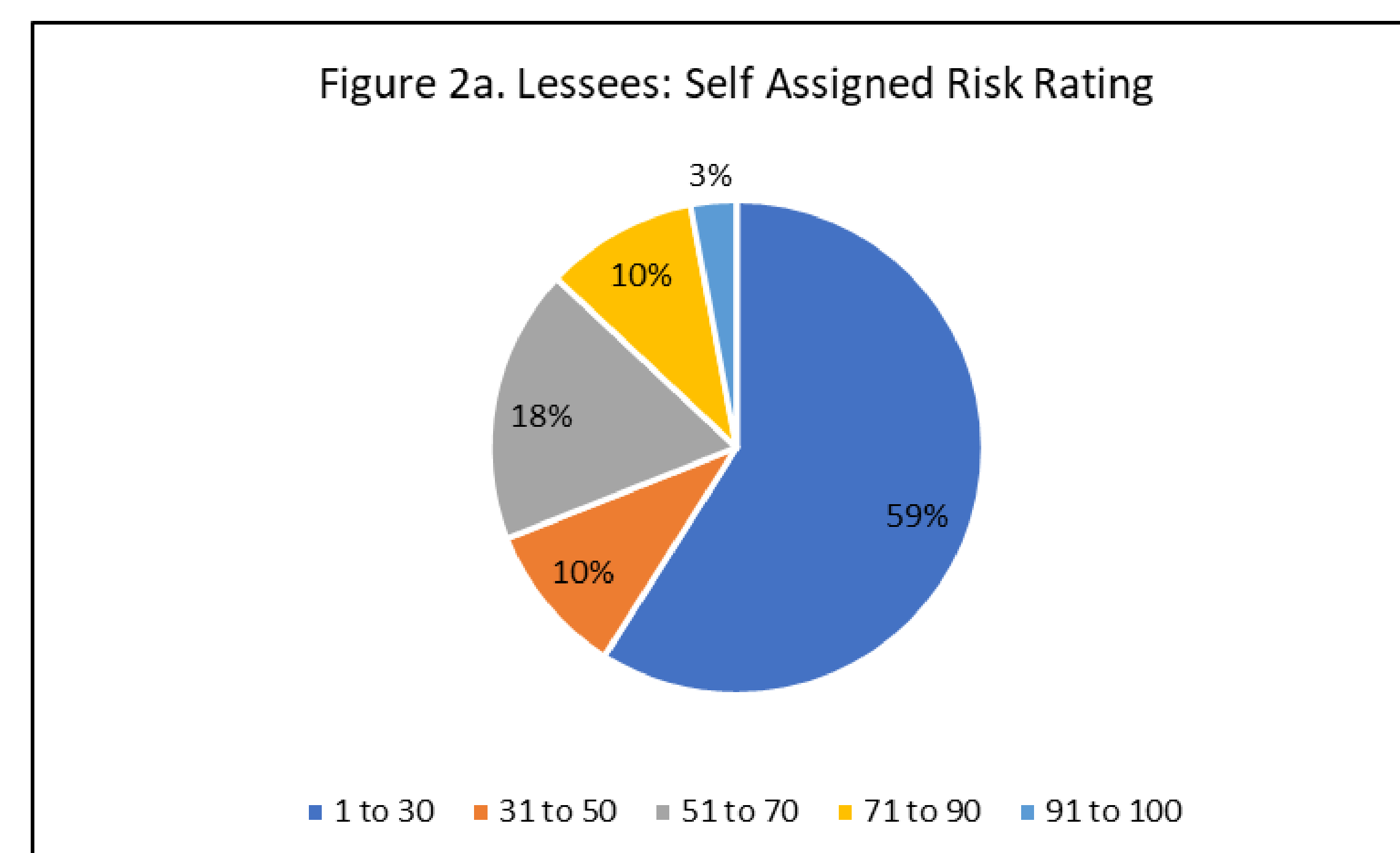
### Demographics and Environmental Preferences

- The literature review reveals that households that adopt solar technology tend to be well educated, wealthy, environmentally conscious, and to have household heads who are older.
- The survey analysis largely supported these characteristics.



## Risk Preferences

- Risk preference is an important element of adoption decisions.
- Households tend to initially underestimate policy risk when making adoption decisions. However, once households became aware of policy risk, investment intentions decreased significantly.



## Peer Effects and Social Norms

- Adopters tend to display a strong preference for social norms, adopting solar to fit in with peers.
- This was especially true of adopters who chose to own their panels.

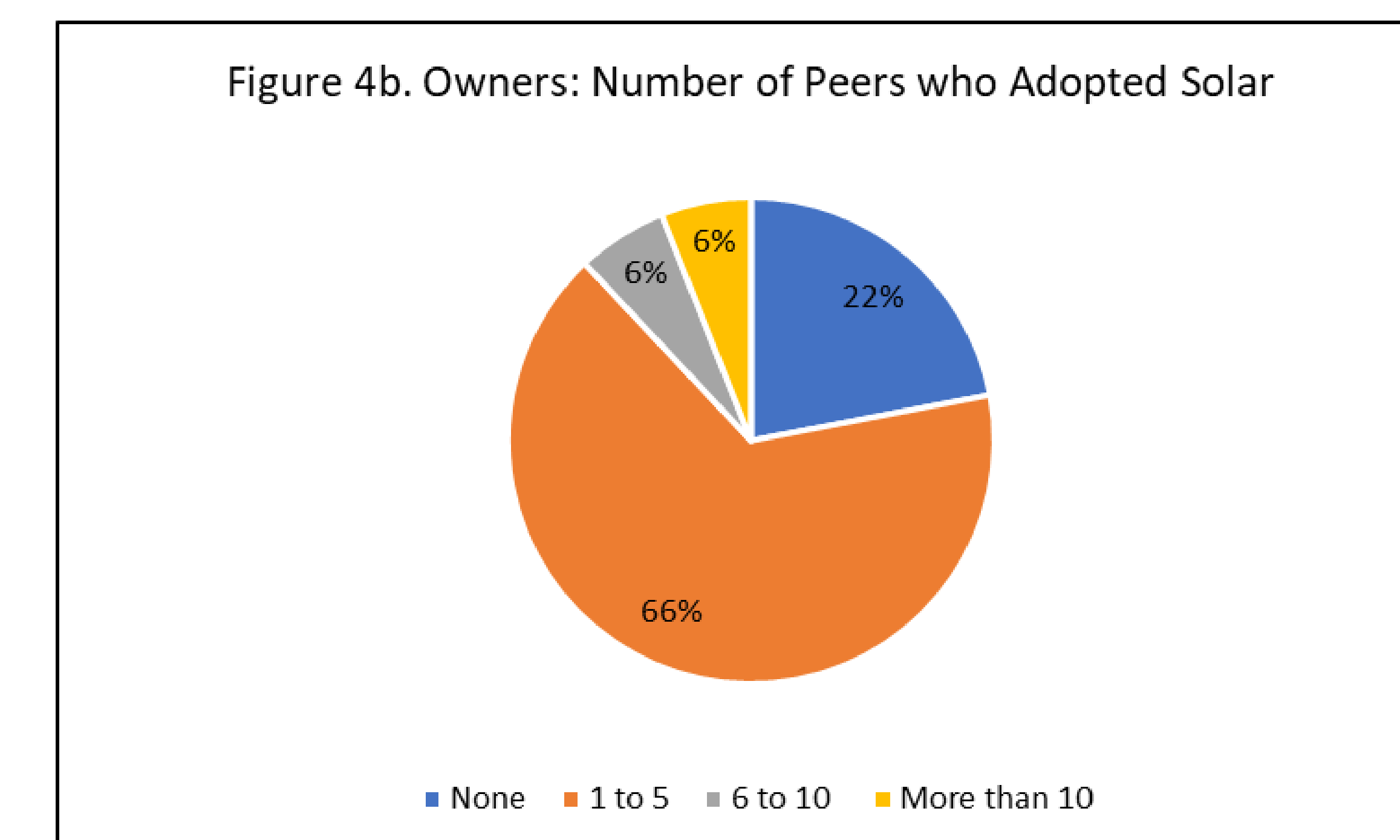
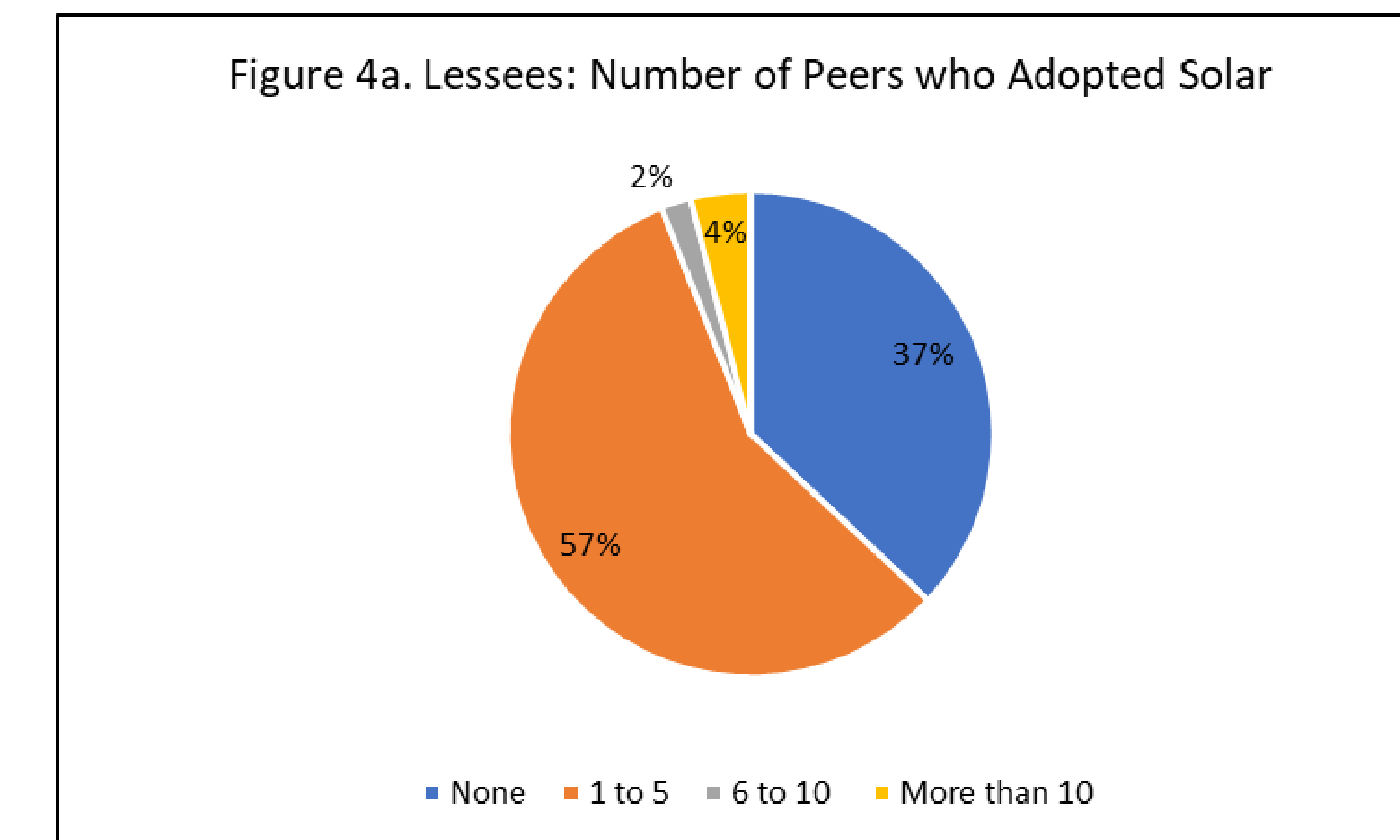
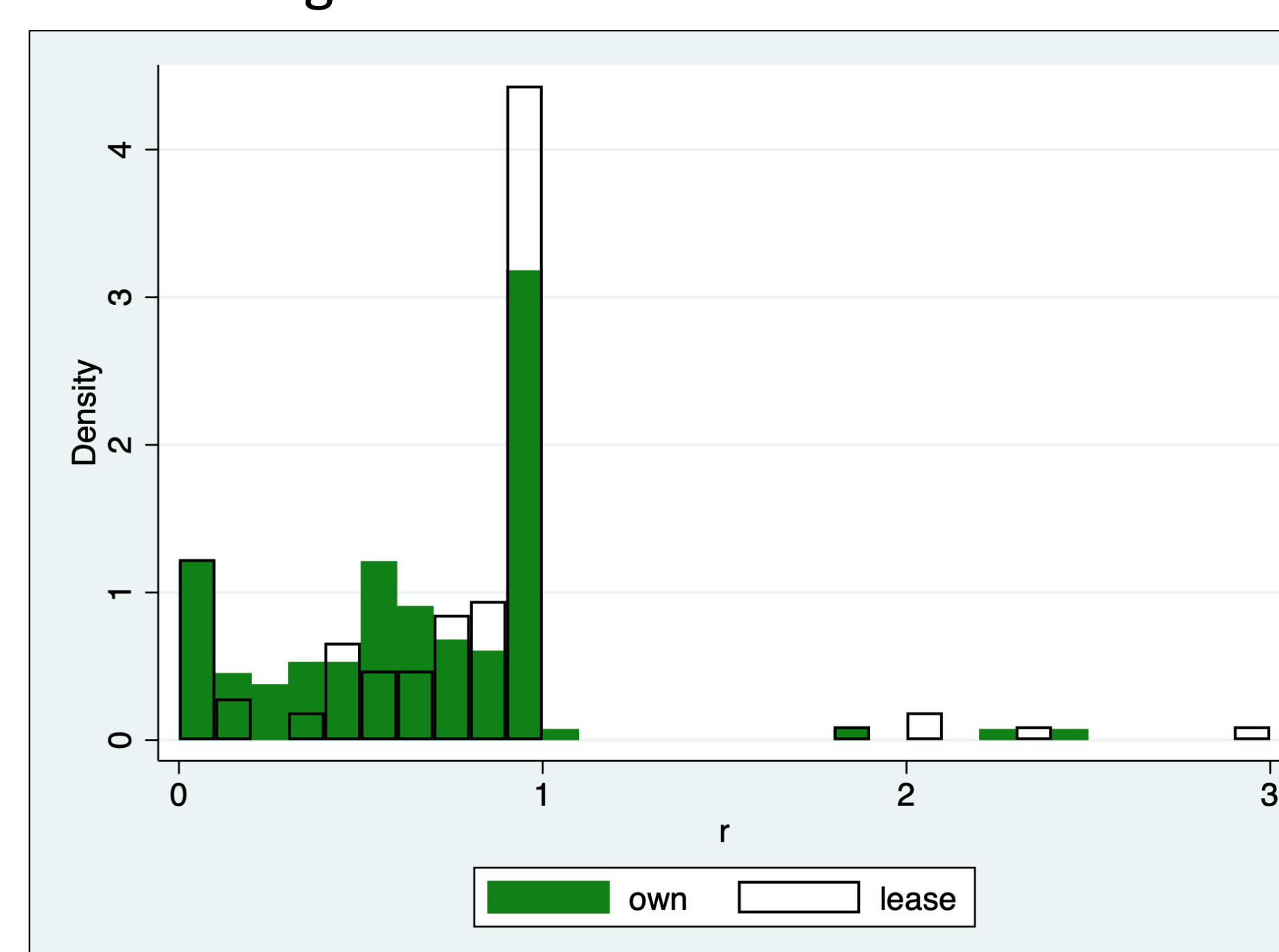


Figure 3. Risk Parameter Estimation



## Discussion

- Further survey research is in progress to investigate claims from the literature that cannot be investigated using the existing survey data including the role of race, housing characteristics (age, size, location, roof orientation), home ownership, and novelty seeking behavior.

## Acknowledgments

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Contact [kghill@umass.edu](mailto:kghill@umass.edu) with any questions, literature review available upon request