# ROUGH FRAMEWORK FOR PAPER (using old material as filler for now)

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First draft: FILL
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**Abstract**

ABSTRACT HERE

# 1 Introduction

Intro

# 2 Defining the Model and Assumptions

Let $Z_i$ represent the treatment status of individual $i$ where $Z_i = 0$ when an individual is not treated, and $Z_i = 1$ when an individual is treated. When using a proxy model, assignment of the treatment is the same for all individuals.

**Definition 1** *(Treatment) Under a proxy, the treatment status of one individual is analogous to the treatment status of the population, i.e.,*

$$Z_i = Z.$$

## 2.1 Comparison to the Instrumental Variable model

The SUTVA (Rubin, 1990):

   *a.* If $Z_i = Z_i'$ then $R_i(\mathbf{Z}) = R_i(\mathbf{Z}')$.

   *b.* If $Z_i = Z_i'$ and $R_i = R_i'$, then $S_i(\mathbf{Z}, \mathbf{R}) = S_i(\mathbf{Z}', \mathbf{R}')$.

Part $a$ of the SUTVA states that an individual's value $R_i$ is only dependent on her own treatment status $Z_i$; i.e. the treatment status of other individuals $Z_j, j \neq i$, does not affect $R_i$. Part $b$ requires that the potential outcomes $S_i(\mathbf{Z}, \mathbf{R})$ of $i$ are independent of the treatment status's $(Z_j)$ and risks $(R_j(\mathbf{Z}))$ of other individuals. Clearly, from Definition 1, part $a$ will always be satisfied under a proxy model.

**Claim 1** *(Assumptions) When applied to a proxy model, the original SUTVA from Rubin's Causal model simplifies to:*

$$If \ Z_i = Z_i' \ and \ R_i = R_i', \ then \ S_i(\mathbf{Z}, \mathbf{R}) = S_i(\mathbf{Z}', \mathbf{R}').$$

# References

Angrist, J.D., Imbens, G.W., and Rubin, D.B. (1996), "Identification of Causal Effects Using Instrumental Variables," *Journal of the American Statistical Association*, 91:444-455.

Angrist, J.D., and Lavy, V. (1999), "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement," *The Quarterly Journal of Economics*, 114(2):533-575.

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# References

[1] M. Goossens, F. Mittelbach, and A. Samarin. *The LATEX Companion*. Addison-Wesley, Reading, Massachusetts, 1993.