An approach to estimation and prediction with response error under simple random sampling

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1. Expanded model for response error attached to position.

   Expected Response: \( y_s \) for \( s = 1,\ldots,N \)

   Response: \( Y_{sk} = y_s + \omega_{sk} \) for \( k = 1,\ldots,r_s \) index of order of measure

   Assume \( r_s = 1 \) for all \( s = 1,\ldots,N \) so that \( k = 1 \). (1 measure of response)

   Assume \( r_s = m \) for all \( s = 1,\ldots,N \) so that \( k = m \). (m measure of response)

   Assume \( r_s = m_s \) for all \( s = 1,\ldots,N \) so that \( k = m_s \). (m_s measure of response)

   a. Does collapsed model lose information?
   b. Partially conditional expanded model.

2. Expanded model for response error attached to position.

   Expected Response: \( y_s \) for \( s = 1,\ldots,N \)

   Response: \( Y_{sk} = y_s \) for \( k = 1,\ldots,r_s \) index of order of measure

   Assume \( r_s = 1 \) for all \( s = 1,\ldots,N \) so that \( k = 1 \). (1 measure of response)

   Assume \( r_s = m \) for all \( s = 1,\ldots,N \) so that \( k = m \). (m measure of response)

   Assume \( r_s = m_s \) for all \( s = 1,\ldots,N \) so that \( k = m_s \). (m_s measure of response)

   a. Does collapsed model lose information?
   b. Partially conditional expanded model.