

# **Structural Equation Modeling in Archival Accounting Research: An Application to Disclosure and Cost of Capital**

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# Structural Equation Modeling

## **Two components – First:**

- Measurement model: generates factors from observed variables
  - Common factor analysis captures the common component or underlying construct based on observed measures
  - By construction, the latent variables are uncorrelated with the measurement error estimated from the observed variables
- Current practice in accounting:
  - Principal component analysis
  - Calculate factor score, which is then used in standard regression

# Structural Equation Modeling

## **Two components – Second:**

- Path model: links the factors together
  - Path analysis provides information on the direction and relative strength of various hypothesized relations
  - Path analysis alone (without the measurement model) is limited in its ability to model very complex relations. For example, our model cannot be tested with path analysis because it would have zero degrees of freedom and would be deterministic
- Current practice in accounting:
  - Path models are used with measured variables

# Structural Equation Modeling

**Full structural equation modeling (SEM) allows for:**

- Estimation of simultaneous equations
- Tests of overall model fit
- Use of common factors with reduced measurement error
  
- Current practice in accounting:
  - Two stage least squares estimation for endogenous variables
  - Reliance on  $R^2$  for fit of individual equations
  - Noisy measured variables (mainly archival data)

# Structural Equation Modeling

## **SEM may be useful in Accounting when:**

- Multiple noisy proxies exist for an underlying construct
- Theory guides the creation of a model
- Models are complex

# Structural Equation Modeling

## **Best practices for reporting SEM results in Accounting:**

- Report full correlation matrix
- Report software used and model convergence
- Report standardized and unstandardized coefficients
- Report fit indexes (chi-square, AIC, TLI, CFI, SRMR, RMSEA)
  - As suggested in Hu and Bentler (1999), we include fit indexes to address simple (path) misspecification (SRMR) and complex (measurement) misspecification (TLI, CFI, RMSEA)

# Our Application of SEM

**Examine the relations between earnings quality, voluntary disclosure quality, information asymmetry, and equity cost of capital**

- Each of these constructs is typically proxied for by several noisy measures
- Theory exists suggesting links between the constructs
- The model is complex – it can't be modeled with path analysis alone

# Our Application of SEM

## **Earnings Quality (EQ)**

- Relates to the amount of imprecision or uncertainty in mandatory information released by a firm (e.g., SEC filings)
- Flexibility exists within accounting rules to allow managers discretion in reporting. As such, some firms' reports better represent underlying economic reality
- Viewed as a form of information risk. In general, higher risk makes it more costly for firms to raise capital



# Our Application of SEM

## **Voluntary Disclosure (VD)**

- Additional information provided by a firm's management that is not mandatory
- In general, investors prefer additional information, so more voluntary disclosure lowers cost of capital

# Our Application of SEM

## **Information Asymmetry (IA)**

- Relates to the distribution or dissemination of information
- Exists between investors (e.g., sophisticated hedge funds vs. me)
- In general, higher information asymmetry increases cost of capital (e.g., due to adverse selection)
- Voluntary disclosure can reduce IA as less information is private. Poor earnings quality can increase IA as it is more difficult to decipher true firm performance

# Our Application of SEM

## **Cost of Capital (CoC)**

- Estimated required rate of return on equity capital
- Represents the cost to a firm to obtain outside financing in the equity market

# Measurement Model

- Earnings Quality (EQ)
  - Earnings volatility (Earn Vol)
  - Abnormal accruals based on balance sheet accruals ( $|AA|$ )
  - Abnormal accruals based on cash flow statement accruals ( $|AA_{CF}|$ )
- Voluntary Disclosure (VD)
  - Number of forecasts (Num)
  - Precision of forecasts (Prec)
  - Accuracy of forecasts (Accur)

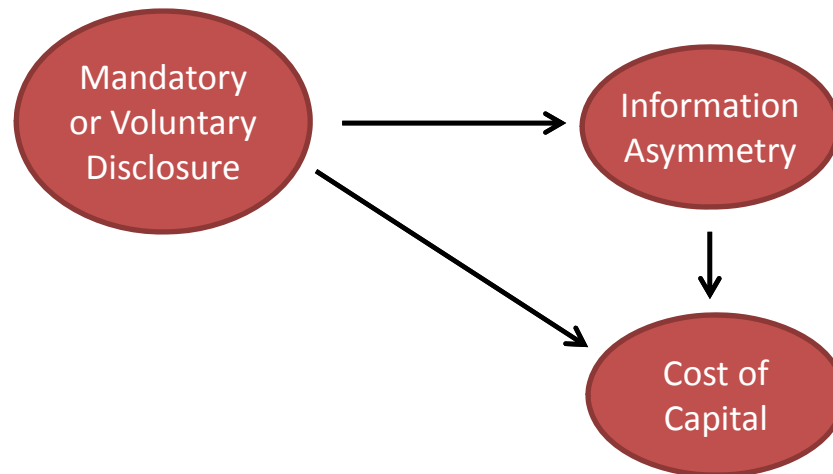
# Measurement Model

- Information Asymmetry (IA)
  - Bid ask spread (Spread)
  - Probability of informed trading (PIN)
  - Amihud's (2002) illiquidity measure (Impact)
- Cost of Capital (CoC)
  - PEG ratio from the earnings growth model and operationalized by Easton (2004) (PEG)
  - Gebhardt, Lee, and Swaminathan (2001) measure from the residual income valuation model (GLS)
  - Kothari, Li, and Short (2009) measure based on the Fama-French (1993) three-factor model (KLS)

# Motivation

## Theoretical debate on the mechanism through which disclosure affects cost of capital

- Theory links information and cost of equity capital:
  - Directly through information risk
  - Indirectly through information asymmetry
- However, several theoretical studies dispute the link through information asymmetry



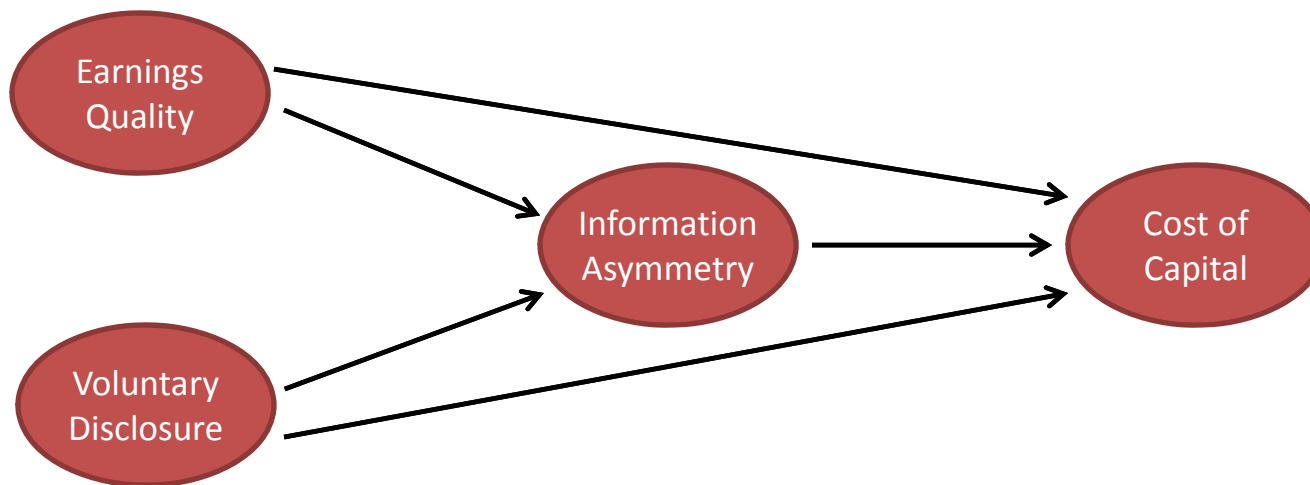
# Motivation

## **Empirical debate on the association between disclosure and cost of equity capital after controlling for earnings quality**

- Early research (e.g., Botosan 1997) found a negative relation between voluntary disclosure and cost of capital but did not control for earnings quality
- Francis et al. (2008) document a negative relation between voluntary disclosure and cost of equity capital, but find that the relation diminishes or disappears after controlling for earnings quality
- Baginski and Rakow (2012) document a negative relation between management forecast policy and cost of equity capital even after controlling for earnings quality

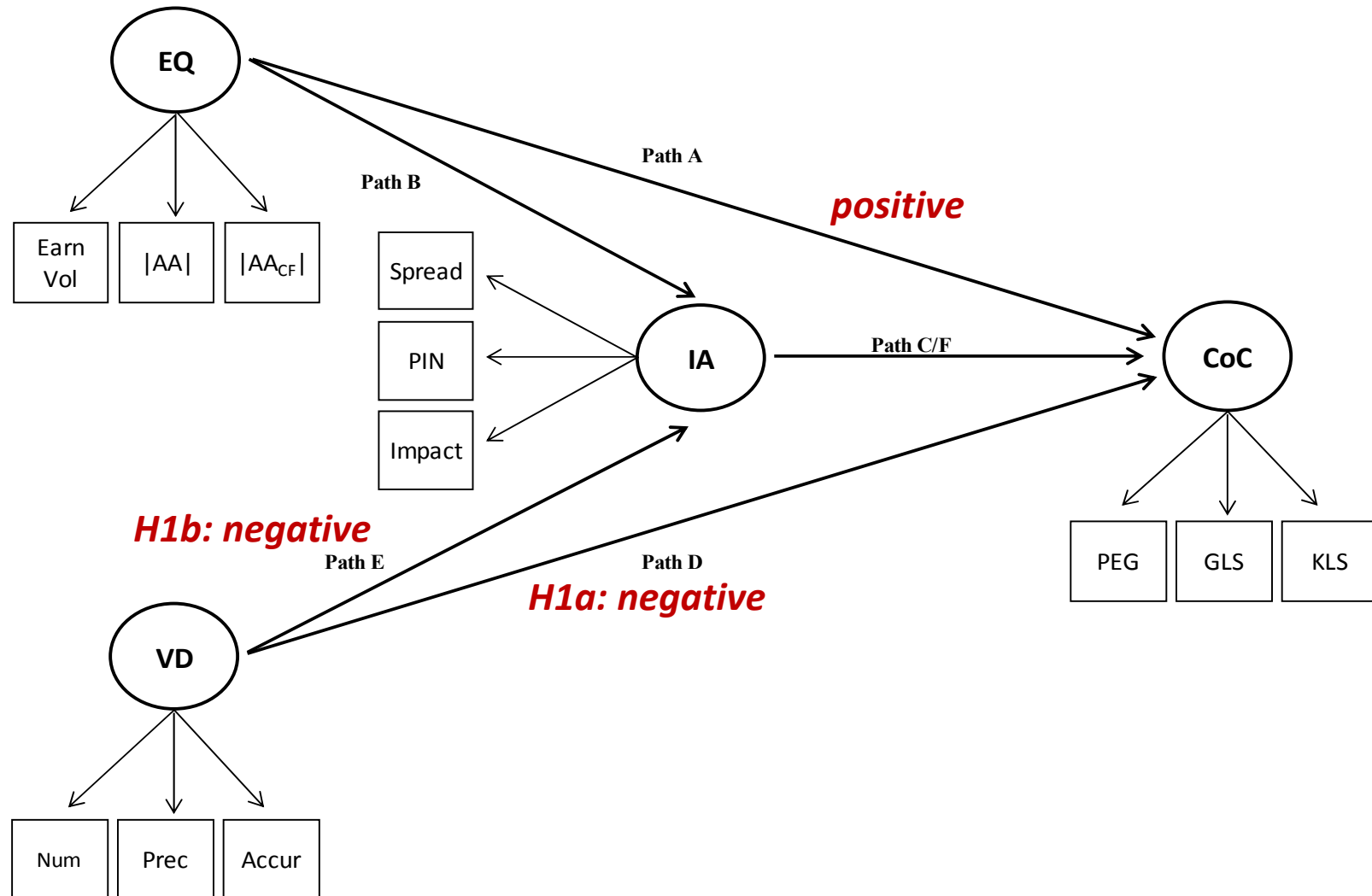
# Research Question and Paths

- After controlling for earnings quality, is voluntary disclosure negatively associated with cost of capital?
- After controlling for the paths from earnings quality to cost of capital, is voluntary disclosure negatively associated with cost of capital indirectly through information asymmetry?

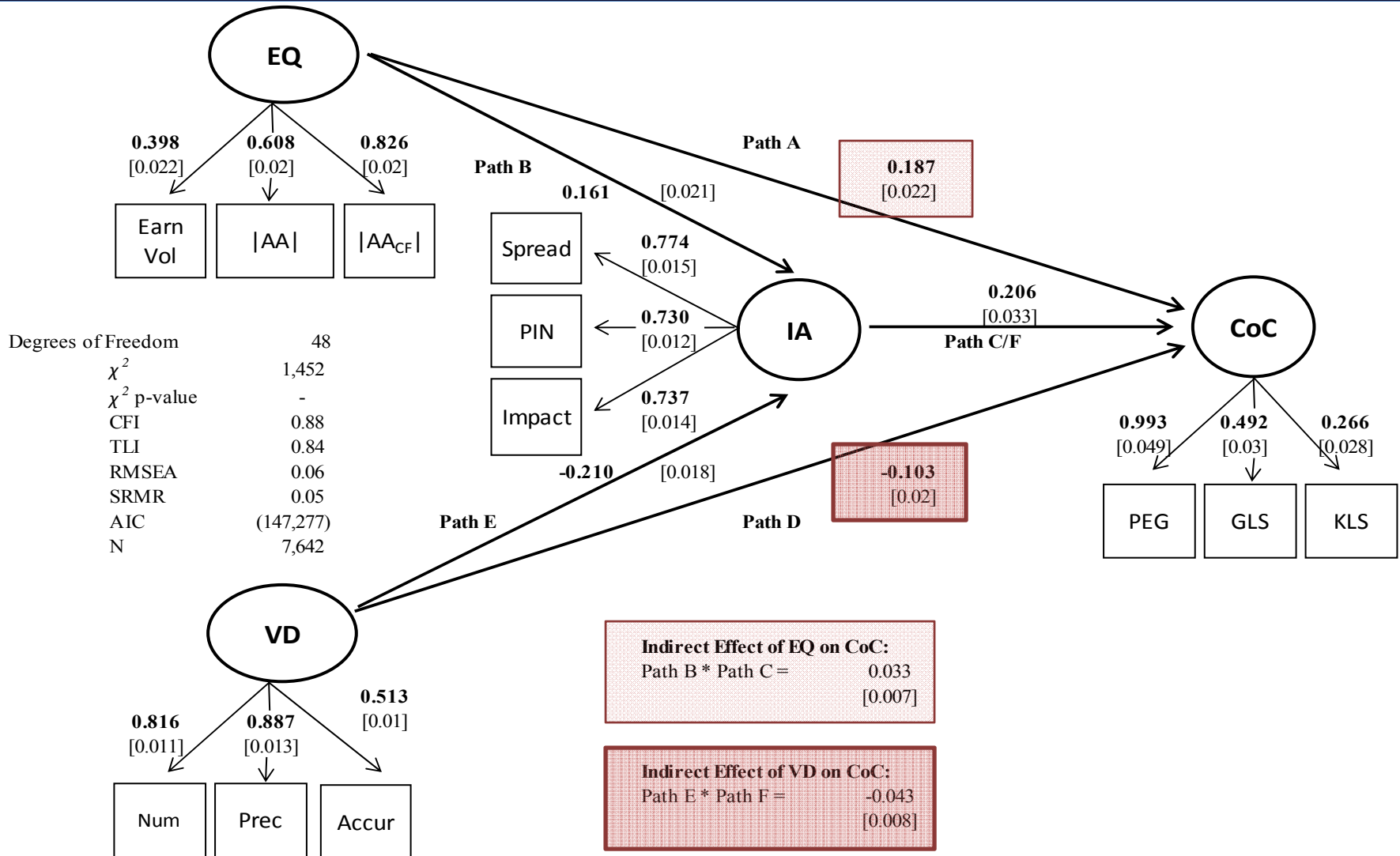




# Empirical Design: Full Model



# Empirical Results: Full Model



# Contributions

- Demonstrate and apply structural equation modeling in a large sample archival accounting study, which allows for simultaneous modeling of the relations of interest using common factors with reduced measurement error
- Corroborate and extend empirical evidence supporting theoretical models that link disclosure to cost of capital through both *information risk* and *information asymmetry*
- Investigate an empirical question currently characterized by mixed results and take advantage of structural equation modeling to provide additional insight into the paths and relative strengths of the paths



*Thank You*