Are IFRS-based and US GAAP-based Accounting Amounts Comparable?

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Section I: Overview

Background

- In 2007 SEC allowed for non-US firms using IFRS to file financial statements without using GAAP
    - Implicit recognition by SEC of IFRS to sufficiently capture information comparable to GAAP
- SEC considered universalizing a set of standards in 2008 to lead US firms to apply IFRS
- Current adoption of IFRS by US firms seems unlikely at present:

    "While it is now clear that U.S. GAAP and IFRS will continue to coexist in our public capital markets for the foreseeable future, it is just as clear that the efforts to enhance the respective standards and to reduce differences between them should continue"[1]

The Big Picture

How comparable are accounting amounts between non-US firms using International Finance Reporting Standards (IFRS) and US firms using US Generally Accepted Accounting Principles (GAAP)?

- Use accounting system comparability - accounting amount predicting economic outcome (e.g. prices, returns, cashflows) of one system predict the same outcome of a different system?
- Use value relevance comparability - is the same variation in outcomes the same as explained by both systems?
- Foreign firms have greater comparability to US Firms on both measures when they apply IFRS than non-US domestic standards
- Comparability is significantly greater for firms that adopt IFRS mandatorily in countries with common law legal orign, strong law enforcement, and more recently.

Related Research and Contribution

Many studies have looked at this topic before. Some examples include:

(1) Examine accounting amounts and and economic implications of non-US firms applying IFRS and domestic standards
(2) Compare accounting amounts and economic implications of US firms applying US GAAP and non-US firms applying domestic standards
(3) Look at non-US companies using IFRS and US GAAP (tends to be country specific and not generalizable)
(4) Compare properties of the accounting amounts of IFRS firms listed on US markets and thus using GAAP - gives mixed results

This study differs in research design of former studies for at least four reasons:

(1) Former studies do not include US firms. This one, by contrast, does.

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[1]SEC, "A U.S. Imperative: High-Quality, Globally Accepted Accounting Standards", 5 January, 2017, https://www.sec.gov/news/statement/white-2016-01-05.html

(2) Properties of accounting amounts from reconciliation of GAAP for foreign firms are not same as application of normal US GAAP for US domestic firms

(3) Reconciliation may have induced cross-listed firms to minimize reconciling items

(4) Within-firm comparisons of GAAP and IFRS based accounting amounts control for factors other than accounting standards

Section II: Predictions

Comparablility before and after IFRS adoption

Prediction 1: *Comparability between SEC and IFRS firms increase after IFRS firms adopt IFRS*

Comparability after IFRS adoption

Prediction 2: *There will be greater comparability for firms in countries with common law legal origns and high enforcement*

Section III: Research Desgin

Data

- Use firms that adopted IFRS between 1995 and 2006.
    - Pre-adoption as early as 1992, and post-adoption as late as 2009
- Get IFRS firms from Worldscope, despite some classification errors.
- Exclude US cross-listings
- US Firms from DataStream. Winsorize.
- Leave out Housing Crisis period.
- Australia, France, Germany, and UK account for 60% of all firm-year observations
- Mostly Manufacturing, Finance, and Service firms (76%)

Assessing Comparability

Use following variables: stock price, stock return, cash flow (economic outcomes), earnings and book value (accounting amounts).

- Get IFRS firms with data the year they adopt IFRS and the year before
- Identify all US firms in the same industry as each IFRS firm
    - Minimize the aggregate size differences between IFRS and matched US firms in IFRS firm's adoption year
- Eliminate any matched pair for which sample size differnce exceeds 50% in magnitude
- Years are inclusive for any matched firm where for which all have data in that given year

Matched Sample Design that pairs similar IFRS firms with US firms helps mitigate effects of inferences on accounting and economic differences between matched firms unattributable to the financial reporting system. Additionally, mitigates the effect on inferences of industry differences in cost of capital (affects how accounting amounts relate to economic outcomes).

Matched Sample Design

A matched pairs design is a special case of a randomized block design. It can be used when the experiment has only two treatment conditions; and subjects can be grouped into pairs, based on some blocking variable. Then, within each pair, subjects are randomly assigned to different treatments.

Imagine a matched pair design for medical testing where 1000 subjects each pair receive one of two treatments - a placebo or a cold vaccine. The 1000 subjects are grouped into 500 matched pairs. Each pair is matched on gender and age. For example, Pair 1 might be two women, both age 21. Pair 2 might be two men, both age 21. Pair 3 might be two women, both age 22; and so on.

For this hypothetical example, the matched pairs design is an improvement over a completely randomized design. Like the completely randomized design, the matched pairs design uses randomization to control for confounding. However, unlike the other design, the matched pairs design explicitly controls for two potential lurking variables - age and gender.[2]

Accounting System Comparability Metrics

Construct Accounting System Comparability as follows:

(1) Estimate relations between stock price and earnings and equity book value separately for US and IFRS firms
(2) For each set of firms, calculate within-sample fitted stock price
(3) For each set of firms, calculate fitted stock price using multiples from other firms.
(4) For each set of firms, calculate absolute value of the difference between fitted stock price obtained in steps (2) and (3).
(5) For each IFRS and matched US firm-year pair, average differences in fitted stock price obtained in step (4).
(6) Calculate price, return, cash flow comparability metrics: mean, median, std.

Example: Stock Price

US firms stock price can be estimated as:

$$P_{it}^{US} = \beta_0^{US} + \beta_1^{US} BVE_{it}^{US} + \beta_2^{US} NI_{it}^{US} + \varepsilon_{it}^{US}$$

Similarly, estimate P_{it}^{IFRS} with respect to estimates and data pertaining to $IFRS$.

Then, calculate within-sample fitted stock price for US firms using the estimated

$$\hat{P}_{it}^{US,US} = \hat{\beta}_0^{US} + \hat{\beta}_1^{US} BVE_{it}^{US} + \hat{\beta}_2^{US} NI_{it}^{US}$$

And, use the $IFRS$ estimated model on the US book value of equity and net income data.

$$\hat{P}_{it}^{US,IFRS} = \hat{\beta}_0^{IFRS} + \hat{\beta}_1^{IFRS} BVE_{it}^{US} + \hat{\beta}_2^{IFRS} NI_{it}^{US}$$

Repeat the above by swapping the nations for each equation. This way, we can calculate the absolute difference between fitted stock prices, stock returns, and cash flow:

$$PRICE\_Diff_{it}^{US} = \left| \hat{P}_{it}^{US,US} - \hat{P}_{it}^{US,IFRS} \right|$$

$$PRICE\_Diff_{it}^{IFRS} = \left| \hat{P}_{it}^{IFRS,IFRS} - \hat{P}_{it}^{IFRS,US} \right|$$

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[2]https://stattrek.com/statistics/dictionary.aspx?definition=matched%20pairs%20design

Table 3
Comparability of IFRS and US GAAP accounting systems, before and after IFRS firms adopt IFRS.

	Pred	Price			Return			Cash Flow		
		Mean	Median	StdDev	Mean	Median	StdDev	Mean	Median	StdDev
Before (N=9500)		12.62	5.76	18.37	0.12	0.06	0.15	0.014	0.007	0.018
After (N=8214)		9.36	3.93	13.94	0.07	0.04	0.07	0.012	0.006	0.014
After − Before	−	−3.26**	−1.83**	−4.43**	−0.04**	−0.02**	−0.08**	−0.002**	−0.001**	−0.004**

*, ** denotes difference between metrics is significant at the 0.10 and 0.05 level, respectively. The means and medians for all metrics are significantly different from zero.
The sample comprises non-US firms that adopted IFRS between 1995 and 2006 (IFRS firms) and a sample of US firms matched to the IFRS firms on size and industry (US firms). The accounting system comparability metrics are the averages of the differences between fitted stock price and stock return for US firms resulting from applying US and IFRS pricing multiples and for IFRS firms resulting from applying US and IFRS pricing multiples. We construct our accounting system comparability metrics in six steps. First, we estimate the relations between stock price (stock return, subsequent year's cash flow) and earnings and equity book value (earnings and change in earnings, earnings) separately for US firms and IFRS firms. Second, for each set of firms, i.e., IFRS and US firms, we calculate within-sample fitted values for stock price (stock return, cash flow). Third, for each set of firms, we calculate fitted values for stock price (stock return, cash flow) using the multiples from the other set of firms. Fourth, for each set of firms, we calculate the absolute value of the difference between the fitted stock price (stock return, cash flow) obtained in the second and third steps. Fifth, for each IFRS and matched US firm–year pair, we average the differences in fitted stock price (stock return, cash flow) obtained in the fourth step. Sixth, we calculate our price, return, and cash flow comparability metrics as the mean, median and standard deviation (StdDev) of the average differences obtained in the fifth step appropriate for each comparability analysis we conduct.

Figure 1: This is a table not a figure!

Then, the differences between all matched firm paits can be averaged. With that, calculate mean, median, and standard deviation coefficients of these averaged differences

Use T-test to test for mean differences. Use Wilcoxon Rank Sum Test (nonparametric alternative to the two-samplet-test which is based solely on the order in which the observationsfrom the two samples fall.) test test for median differences. Use bootstrapping to test for significant differences of standard deviations.

What is bootstrapping?

> "In statistics, bootstrapping is any test or metric that relies on random sampling with replacement. Bootstrapping allows assigning measures of accuracy (defined in terms of bias, variance, confidence intervals, prediction error or some other such measure) to sample estimates. This technique allows estimation of the sampling distribution of almost any statistic using random sampling methods. Generally, it falls in the broader class of resampling methods.[3]"

In this case, they randomly assign a US/IFRS firm to a IFRS/US firm. Then, the matched pair is randomly assigned to the subgroup. Between sample of two, calculate difference. Repeating at least 1000 times, a distribution is generated. Then, a standard deviation difference can be deemed "significant" if the sample difference exceeds 950 of the differences calculated based on the bootstrapping procedure. Requires no new data, and no distributional assumptions. Interesting to note, bootstrapping will, on average, leave unsampled about 33% of the original data.

To test whether accounting system comparability changed after non-US IFRS firms adopt IFRS, compute accounting system comparability metrics using years before and after adoption of IFRS to compare. (*Table III*)

To test whether accounting system comparability differs after IFRS firms adopt IFRS depending on legal origin (common law vs code law) and mandatorily (i.e., law enforcement), partition firm-year observations after adopting IFRS into demarcated groups and calculate separate accounting system metric for each group (*Table IV*).

Results:

- Price, Return, and Cash Flow comparability metrics are significantly different from before and after IFRS firms adopt IFRS.

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[3]https://en.wikipedia.org/wiki/Bootstrapping_(statistics)

Table 4
Comparability of IFRS and US GAAP accounting systems, for sample partitions after IFRS firms adopt IFRS.

	Pred	Price			Return			Cash Flow		
		Mean	Median	StdDev	Mean	Median	StdDev	Mean	Median	StdDev
Panel A: Voluntary and mandatory adoption										
Voluntary (N=1002)		19.73	8.39	23.12	0.10	0.05	0.11	0.020	0.009	0.028
Mandatory (N=7212)		7.91	4.49	11.27	0.07	0.04	0.08	0.018	0.007	0.013
Mandatory – Voluntary	?	−11.82**	−3.90**	−11.85**	−0.03**	−0.01**	−0.03**	−0.002**	−0.002**	−0.015**
Panel B: Common and code law legal origin										
Code (N=4459)		12.64	4.08	18.02	0.08	0.05	0.09	0.016	0.009	0.020
Common (N=3755)		5.77	4.00	6.30	0.07	0.05	0.09	0.011	0.007	0.012
Common – Code	–	−6.87**	−0.08	−11.72**	−0.01**	0.00	0.00	−0.005**	−0.002**	−0.008**
Panel C: High and low enforcement										
Low (N=3841)		10.59	3.52	15.71	0.08	0.05	0.15	0.015	0.008	0.017
High (N=4373)		5.89	4.34	6.16	0.07	0.04	0.09	0.011	0.007	0.015
High – Low enforcement	–	−4.70**	0.82	−9.55**	−0.01*	−0.02**	−0.06**	−0.004*	−0.001	−0.002

*, ** denotes difference is significant at the 0.10 and 0.05 level, respectively. All metrics are significantly different from zero.

Figure 2:

- Firms which madatorily adopt IFRS have greater comparability with US firms - must be more consistent in application and enforcement of the law.
- Generally the case that comparable standards are more likely in countries with common law.
- Higher enforcement entails more comparability.

Value Relevance Comparability Metrics

This test uses explanatory power of regressions to see if the variation between US and IFRS firms is consistently explained for an economic outcome.

Table 5
Comparison of IFRS and US firms' value relevance before and after IFRS firms adopt IFRS.

	Prediction	Price	Return	Cash Flow
Before IFRS adoption (N=9500 IFRS and US firms)				
IFRS firms		0.20	0.07	0.20
US firms		0.47	0.09	0.44
IFRS firms – US firms	–	−0.27**	−0.02**	−0.24**
After IFRS adoption (N=8214 IFRS and US firms)				
IFRS firms		0.34	0.09	0.28
US firms		0.53	0.10	0.51
IFRS firms – US firms	–	−0.20**	−0.01	−0.23**
After – Before IFRS adoption				
Change in absolute difference	–	−0.07**	−0.01**	−0.01*

Price is based on the explanatory power from a regression of stock price, P, on net income per share, NI, and book value of equity per share, BVE. In particular, Price is the difference between the adjusted R^2 from Eq. (1) and the adjusted R^2 from the nested version of Eq. (1) that includes only the C_j and I_k:

$$P_{it} = \beta_0 + \beta_1 BVE_{it} + \beta_2 NI_{it} + \sum_j \beta_{3j} C_j + \sum_k \beta_{4k} I_k + \varepsilon_{it}. \tag{1}$$

Return is based on the adjusted R^2 from a regression of annual stock return, $RETURN$, on net income and change in net income, deflated by beginning of year price, NI_t/P_{t-1} and $\Delta NI_t/P_{t-1}$. In particular, Return is the difference between the adjusted R^2 from Eq. (2) and the adjusted R^2 from the nested version of Eq. (2) that includes only the C_j and I_k:

$$RETURN_{it} = \beta_0 + \beta_1 NI_{it}/P_{it-1} + \beta_2 \Delta NI_{it}/P_{it-1} + \beta_3 LOSS_{it} + \beta_4 LOSS_{it} \times NI_{it}/P_{it-1} + \beta_5 LOSS_{it} \times \Delta NI_{it}/P_{it-1} + \sum_j \beta_{6j} C_j + \sum_k \beta_{7k} I_k + \varepsilon_{it}. \tag{2}$$

We measure $RETURN$ as the cumulative percentage change in stock price beginning nine months before fiscal year end and ending three months after fiscal year end, adjusted for dividends and stock splits. NI/P is net income per share scaled by beginning of year stock price; $LOSS$ is an indicator variable that equals one if NI/P is negative, and zero otherwise; and Δ denotes annual change.

Cash Flow is based on the R^2 from the regression of cash flow on lagged net income. In particular, Cash Flow is the difference between the adjusted R^2 from Eq. (3) and the adjusted R^2 from the nested version of Eq. (3) that includes only the C_j and I_k:

$$CF_{it+1} = \beta_0 + \beta_1 NI_{it}/TA_{it-1} + \sum_j \beta_{2j} C_j + \sum_k \beta_{3k} I_k + \varepsilon_{it+1}, \tag{3}$$

where NI is net income, TA is total assets, and CF is net cash flow from operations scaled by lagged total assets.

To test for differences in R^2, we estimate the equations 1000 times, randomly assigning firms to the relevant partitions and base significance tests on the frequency of observing an R^2 difference greater than or equal to the tabulated difference. The sample comprises non-US firms that adopted IFRS between 1995 and 2006 (IFRS firms) and a sample of US firms matched to the IFRS firms on size and industry (US firms).

Table 6
Comparison of IFRS and US firms' value relevance for sample partitions after IFRS firms adopt IFRS.

	Prediction	Price	Return	Cash Flow
Panel A: Voluntary and mandatory adoption				
Voluntary adoption (N=1002 IFRS and US firms)				
IFRS firms		0.24	0.05	0.18
US firms		0.53	0.06	0.51
IFRS firms – US firms	–	−0.29**	−0.02	−0.34**
Mandatory adoption (N=7212 IFRS and US firms)				
IFRS firms		0.39	0.09	0.29
US firms		0.54	0.10	0.51
IFRS firms – US firms	–	−0.15**	−0.01	−0.22**
Mandatory – Voluntary				
Difference in absolute difference	?	−0.14**	−0.01	−0.12**
Panel B: Code and common law legal origin				
Code (N=4459 IFRS and US firms)				
IFRS firms		0.37	0.08	0.23
US firms		0.50	0.08	0.52
IFRS firms – US firms	–	−0.13**	0.00	−0.30**
Common (N=3755 IFRS and US firms)				
IFRS firms		0.50	0.10	0.34
US firms		0.54	0.08	0.51
IFRS firms – US firms	–	−0.05	0.01	−0.17**
Common – Code				
Difference in absolute difference	–	−0.07**	0.01	−0.12**
Panel C: High and low enforcement				
Low enforcement (N=3841 IFRS and US firms)				
IFRS firms		0.37	0.08	0.25
US firms		0.54	0.09	0.53
IFRS firms – US firms	–	−0.17**	−0.01	−0.28**
High enforcement (N=4373 IFRS and US firms)				
IFRS firms		0.40	0.09	0.28
US firms		0.48	0.09	0.49
IFRS firms – US firms	–	−0.08*	0.00	−0.21**
High – Low enforcement				
Difference in absolute difference	–	−0.09**	−0.01	−0.07**

*, ** denotes difference or change in difference is significant at the 0.10 and 0.05 level, respectively.
Price is based on the explanatory power from a regression of stock price, P, on net income per share, NI, and book value of equity per share, BVE. In particular, Price is the difference between the adjusted R^2 from Eq. (1) and the adjusted R^2 from the nested version of Eq. (1) that includes only the C_j and I_k:

Results:

- Difference in value relevance decreased significantly from when IFRS firms applied non-US domestic standards to when they applied IFRS.
  - Consistent with prediction that value relvance is higher for US firms than for IFRS firms before they adopt IFRS.
  - fter IFRS firms adopt, value relevance is higher for US firms, significantly for price and cash flow.
- Table 6 shows similarly story of Table 3, but returns are never signficant.

Accounting Quality

Goal: Look at potential sources of differences in comparability across dimensions of accounting quality. Previous literature has provided three areas of assessing quality: earnings smoothing, accrual quality, and earnings timeliness.

Earnings Smoothing: Adjusting fluctuations on realized earnings. The first metric looks at the variance of the change in net income over the variance in the change in cash flows. A higher ratio suggests less earnings smoothing. Second metric is correlation between accruals and cash flows.

Accrual Quality: Size of accruals can be used as a measure of quality since accruals can be used for

manipulation. Their measure regresses accruals on lagged cash flows. Lower standard deviation on residuals indicative of higher quality.

Timeliness: Metrics are Good News and Bad News measured by R^2 from regression of net income scaled by begiining of year price on residual from regression of stock return on country and industry fixed effects ($RETURN_{it}^*$). Higher R^2 is sign of greater timeliness.

Table 7
Comparison of IFRS and US firms' dimensions of accounting quality.

	Smoothing		Accrual Quality	Timeliness	
	Var(ΔNI*)/Var(ΔCF*)	Cor(ACC*, CF*)		Good News	Bad News
Panel A: Before and after IFRS firms adopt IFRS					
Before (N=9500 IFRS and US firms)					
IFRS firms	0.761	−0.450	0.059	0.001	0.079
US firms	0.896	−0.341	0.073	0.018	0.131
IFRS firms − US firms	−0.135**	−0.109**	−0.014**	−0.017**	−0.053**
After (N=8214 IFRS and US firms)					
IFRS firms	0.979	−0.522	0.059	0.006	0.045
US firms	1.059	−0.428	0.057	0.015	0.104
IFRS firms − US firms	−0.080**	−0.094**	0.002	−0.010**	−0.059**
After − Before adoption					
Change in absolute difference	−0.055**	−0.014*	−0.012**	−0.007**	0.006
Panel B: Voluntary and mandatory adoption					
Voluntary (N=1002 IFRS and US firms)					
IFRS firms	0.812	−0.351	0.048	0.001	0.038
US firms	0.973	−0.321	0.056	0.036	0.112
IFRS firms − US firms	−0.156**	−0.030	−0.008**	−0.035**	−0.074**
Mandatory (N=7212 IFRS and US firms)					
IFRS firms	0.100	−0.250	0.061	0.006	0.047
US firms	1.074	−0.251	0.057	0.011	0.098
IFRS firms − US firms	−0.076**	−0.001	0.003**	−0.005**	−0.051**
Mandatory − Voluntary					
Difference in absolute difference	−0.081**	−0.029	−0.004**	−0.030**	−0.023
Panel C: Common law and code law legal origin					
Code (N=4459 IFRS and US firms)					
IFRS firms	0.858	−0.330	0.054	0.011	0.029
US firms	1.026	−0.288	0.057	0.022	0.091
IFRS firms − US firms	−0.169**	−0.043**	−0.003**	−0.011**	−0.061**
Common (N=3755 IFRS and US firms)					
IFRS firms	1.113	−0.184	0.067	0.000	0.066
US firms	1.026	−0.288	0.058	0.022	0.083
IFRS firms − US firms	0.086**	0.105**	0.010**	−0.022**	−0.017
Common − Code					
Difference in absolute difference	−0.082**	0.061**	0.007**	0.011**	−0.045**
Panel D: High and low enforcement					
Low (N=3841 IFRS and US firms)					
IFRS firms	0.900	−0.317	0.003	0.008	0.027
US firms	1.015	−0.269	0.003	0.012	0.094
IFRS firms − US firms	−0.115**	−0.048**	0.000	−0.004*	−0.067**
High (N=4373 IFRS and US firms)					
IFRS firms	1.034	−0.221	0.004	0.001	0.057
US firms	1.094	−0.261	0.004	0.024	0.094
IFRS firms − US firms	−0.060**	−0.040*	0.000	−0.023**	−0.037**
High − Low enforcement					
Change in absolute difference	−0.055**	−0.008*	0.000	0.019**	−0.030**

*, ** denotes difference or change in difference is significant at the 0.10 and 0.05 level, respectively.
Var(ΔNI*)/Var(ΔCF*) is the ratio of the variance of the change in net income to the variance of the change in cash flow, where ΔNI* (ΔCF*) is the residual from a regression of $\Delta NI_t/TA_{t-1}$ (ΔCF_t) on industry and country fixed effects. ΔNI is change in net income per share, ΔCF is change in cash from operations deflated by lagged is total assets, and TA is total assets.
Cor(ACC*, CF*) is the correlation between accruals and cash flow, where ACC* (CF*) is the residual from a regression of accruals scaled by lagged total assets, ACC_t/TA_{t-1} (CF), on industry and country fixed effects.
Accrual Quality is the standard deviation of residuals from the regression of ACC* on prior year, current year, and subsequent year cash flow, each deflated by its lagged total assets,

$$ACC_{it}^* = \beta_0 + \beta_1 CF_{it-1} + \beta_2 CF_{it} + \beta_3 CF_{it+1} + \varepsilon_{it}.$$

Good News and Bad News are the R^2s from the regression of the ratio of net income to lagged stock price, NI_t/P_{t-1}, on the residual from a regression of stock return on country and industry fixed effects, $RETURN_t^*$, $NI_{it}/P_{it-1} = \beta_0 + \beta_1 RETURN_{it}^* + \varepsilon_{it}$. We estimate the equation separately for positive and negative return subsamples. Good News (Bad News) is the R^2 relating to the positive (negative) subsample.

Big picture: All post-adoption sample periods, except for common law firms, show accounting amounts of US firms exhibit higher quality than IFRS firms. Quality differnce is smaller between US and IFRS firms for mandatory adopters in high enforcement countries.

Additional Analysis

(1) Look at differences in regression coefficients used in constructing the comparability metrics
(2) Repeat Analysis in 2005-2006, 2007-2009
(3) Test for globalization using non IFRS firms who can't implement it
(4) Test to see if three largest industries (Finance, Manufacturing, Services) account for most of the results

- Differences in Regression coefficients used in constructing the comparability metrics for IFRS and US firms are smaller after IFRS firms adopt IFRS and for post-adoption sample partitions that exhibit greater comparability.
- Comparability greater in recent years
- Globalization does not explain findings
- Some significant increases in value relevance for the three big sectors consistent with overall sample, with some exceptions in finance sector

New Information in Earnings - Ball and Shivakumar 2008

- How impressed should we be by R^2? Is such an account convincing?
- Danger of trying to fit best models?
- Other ways of model specification?