



The Global Standard for Business Research

<http://wrds.wharton.upenn.edu>

WRDS E-Learning Session

Linking Databases on WRDS Tables and Macros

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E-Learning Session Guidelines

Welcome to WRDS E-Learning. Please use the following guidelines:

- Ask Questions via the “Chat” Window.
- Audio problems? Disconnect and call in using one of the phone numbers listed in the reminder email.

Agenda

- Introduction and Conceptual Framework
- Best Practices in Merging Information from Multiple Sources
- Linking Tables on WRDS: Clean and Ready Solutions
- WRDS Linking Macros: Transparent, Effective, & Extensible
 - Mapping Permanent Identifiers using Names Tables
 - Linking in the Absence of Primary Identifiers

“Recycling” is not always a good thing

Ticker Recycling Times	TICKER	PERMNO	Trading Symbol	Exchange Code	Start Date	End Date	Company Name Header	Primary Exchange Header
6	BEST	58018		3	28JUL1972	28JUL1974	BEST PRODUCTS INC	N
6	BEST	19925	BESTE	3	29JUN1982	28MAR1985	BURTON ENERGY & SOLAR TECHNOLOGY	Q
6	BEST	12221	BEST	3	04APR1988	16AUG1989	BESTWAY INC	Q
6	BEST	80735	BESTQ	3	25JUL1994	27NOV1996	BEST PRODUCTS INC NEW	Q
6	BEST	85360	BEST	3	30SEP1997	18FEB2000	BEST SOFTWARE INC	Q
6	BEST	92553	BEST	3	14FEB2008	30SEP2010	SHINER INTERNATIONAL INC	Q
7	SI	36505		2	02JUL1962	14JUL1968	SIGNAL COMPANIES INC	N
7	SI	36513		2	02JUL1962	04NOV1965	SIGNAL OIL & GAS CO	A
7	SI	48442		2	29MAY1969	31OCT1971	RILEY COMPANY	A
7	SI	56047		2	05DEC1972	10OCT1974	STELBER INDUSTRIES INC	A
7	SI	63351		2	08SEP1981	28OCT1986	LIFETIME CORP	N
7	SI	75277		1	20MAY1988	19DEC2000	A C M GOVT SPECTRUM FD INC	N
7	SI	88935	SI	1	12MAR2001	30SEP2010	SIEMENS A G	N
8	ATC	39511		1	07AUG1963	29APR1966	ATLAS CR CORP	N
8	ATC	45006		2	19SEP1967	15NOV1968	ATLANTIC CO	A
8	ATC	50745		2	22JUN1970	25MAY1972	SOUTH ATLANTIC FINL CORP	Q
8	ATC	57955		2	10JUL1974	09SEP1980	AUTO TRAIN CORP	A
8	ATC	54084		1	01FEB1982	29APR1984	HALLWOOD GROUP INC	A
8	ATC	70375		2	07NOV1986	30JUL1996	J T S CORP	A
8	ATC	84157		2	14JUL1997	30APR2000	TERREMARK WORLDWIDE INC	Q
8	ATC	89761	ATC	2	19JUN2003	30SEP2010	CYCLE COUNTRY ACCESSORIES CORP	A

Companies Change Over Time

Merging Databases using Common Secondary Identifiers

DATE	DATABASE 1	DATABASE 2	DATABASE 3	DATABASE 4
t	CUSIP1	CUSIP2	CUSIP1	CUSIP1
$t+1$	CUSIP1	CUSIP2	CUSIP1	CUSIP1
$t+2$	CUSIP1	CUSIP2	CUSIP1	CUSIP1
$t+3$	CUSIP1	CUSIP2	CUSIP1	CUSIP3
$t+4$	CUSIP1	CUSIP2	CUSIP1	CUSIP3
$t+5$ Change	CUSIP2	CUSIP2	CUSIP1	CUSIP3
$t+6$	CUSIP2	CUSIP2	CUSIP1	CUSIP3
$t+7$	CUSIP2	CUSIP2	CUSIP2	CUSIP3
$t+8$	CUSIP2	CUSIP2	CUSIP2	CUSIP3
	CRSP	COMPUSTAT	TAQ/Thomson	IBES

Best Practices: Understand Your Data

- Header vs. Historical Identifiers: understand the nature of the data (e.g. can you find K-Mart in Compustat?)
- Do you databases have “Names” datasets: Mappings between proprietary permanent identifiers (e.g. PERMNO in CRSP) and secondary identifiers (e.g. CUSIP Number, Ticker Symbol)
- Issue vs. Company Specific: relaxing the mapping conditions accordingly (e.g. 6-digit CUSIP vs. 8-digit CUSIP)
- **Always** Use **Multi-Step** Approach: (1) link table , (2) merging
- Periodicity of different datasets: do not assume same date/time frequencies, test it, and use flexible joins

Best Practices: Rules and Definitions

of Common Secondary Identifiers

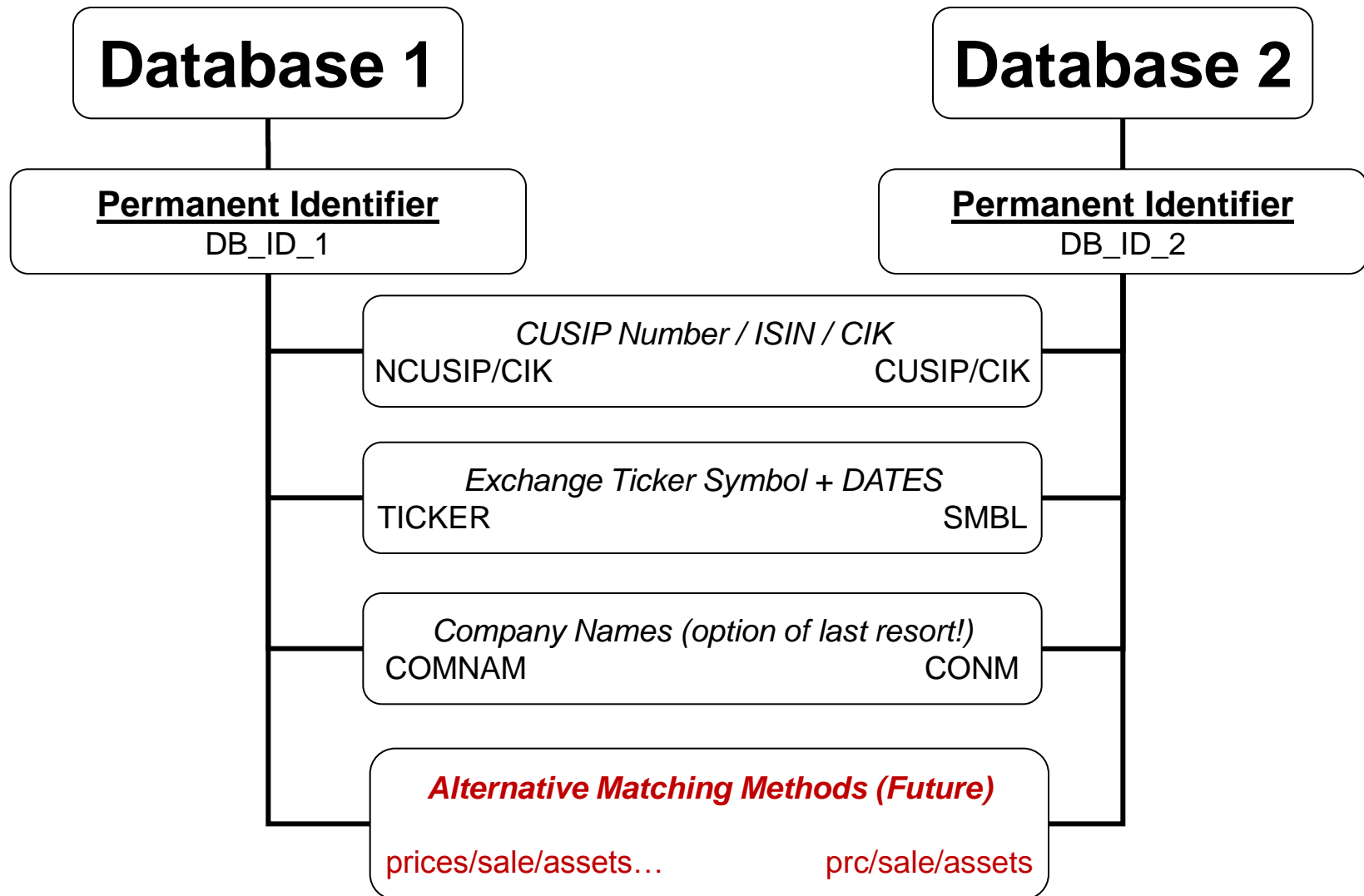
- **Tickers, 8-digit CUSIPs, and ISINs** identify securities. 6-digit CUSIP is company specific. Ticker is assigned by exchange. CUSIP by S&P CUSIP bureau. ISIN is 12 digit identifier based on CUSIP for US companies. **ALL can change overtime.**
- **Stock tickers** are exchange specific, have suffixes, can change, and **often** are reused. Rule: *always use tickers with dates (and exchanges) in linking*
- **CUSIPs** and **ISINs** also change but are **NOT** recycled. Rule: *Most Effective Linking. Use entire 8-digit CUSIP or 12-digit ISIN to link issue-specific data (price, volume, EPS...). Rule: CUSIP and ISIN issue identifiers are not exchange-specific*
- **CIK** is the Company's Filing Number at the SEC, and **can** change. Rule: *Use GVKEY-CIK Link Table in WRDS, to track all filings of a certain company*
- **Neither** Ticker, CUSIP, ISIN, or CIK may identify a M&A/Restructuring path for a company / security
- Company Names are often abbreviated/manipulated by data vendors. Rule: *Very difficult to write a reliable merging program using company names*
- Lost links, unlinkable cases, & wrong links create **survivorship biases**

Linkable U.S. Databases on WRDS

	Permanent & Primary Identifiers	Common Secondary Identifiers			
	<i>security / company unique identifiers</i>	CUSIP / ISIN	Ticker	CIK	Names File with Dates
COMPUSTAT	GVKEY	Header 9-digit Global: ISIN	Header	Header	Security and company (header info only)
CRSP	PERMNO	8-digit	x (modified)		stocknames
IBES	IBES TICKER	8-digit Global: SEDOL	x		id, idsum...
OptionMetrics	SECID	8-digit	x		secnmd
TAQ		12-digit CUSIP	x (with suffixes)		master
RiskMetrics	CUSIP	6-digit	x		
Thomson		8-digit	x		
WRDS-SEC Platform	We create a Unique Identifier Map	In the Filings Text	In the Filings Text	x	We create a Names File
Audit Analytics			x	x	
GSI Online			x	x	

Multi-Step Approach

1. Link Primary Identifiers using Common Identifiers
2. Use Link Table in Merging data from both databases



Linking Tables on WRDS

Linking Tables at WRDS

- CRSP-Compustat Merged Product: **CCM**
<http://wrds-web.wharton.upenn.edu/wrds/ds/crsp/>
Links GVKEY-IID and PERMNO
- **WRDS** Mutual Fund Linking Table: **MFLINKS**
<http://wrds-web.wharton.upenn.edu/wrds/ds/mfl/>
Mapping between CRSP Funds share classes and Thomson-Reuters Fund Portfolios
- **WRDS** DealScan Linking Table:
Chava and Roberts (2008): <http://finance.wharton.upenn.edu/~mrrobert/>
Mapping between GVKEY and DS company id, and corresponding facility and package ids
- **WRDS** CIK Linking Tables: **WCIKLINK**
<http://wrds-web.wharton.upenn.edu/wrds/ds/sec/>
Links CIK with historical CUSIP, and Links GVKEY with historical CIKs

WRDS CIK Link Tables

- WRDS CIK Link Tables: datasets that map **CIK** to **all historical** company legal names, CUSIP numbers, and other identification information
 - WCIKLINK_NAMES: lists of all company names for a given CIK, with informative statistics
 - WCIKLINK_CUSIP: maps a CIK to all CUSIPs that appear in a company's filings
 - WCIKLINK_GVKEY: maps between GVKEY and 'Historical' CIKs. Adds 3000+ GVKEY-CIK historical records to the 'header' Company GVKEY-CIK map in Compustat
- **Essential** to track all historical filings for public companies
- Retain historical records for companies that are undergoing restructuring and are more likely to change their CIK filing number
- Researchers use GVKEY-CIK historical map to avoid **selection and survivorship bias** concerns

WRDS CIK LinkTable

Filing Example: <http://www.sec.gov/Archives/edgar/data/1288776/000119312510032286/0001193125-10-032286.txt>

<ACCEPTANCE-DATETIME>20100216160831

ACCESSION NUMBER: 0001193125-10-032286
 CONFORMED SUBMISSION TYPE: SC 13G/A
 PUBLIC DOCUMENT COUNT: 1
 FILED AS OF DATE: 20100216

FILED BY:

COMPANY DATA:

COMPANY CONFORMED NAME: Page Lawrence
 CENTRAL INDEX KEY: 0001295231

FILING VALUES:

FORM TYPE: SC 13G/A

MAIL ADDRESS:

STREET 1: 1600 AMPHITHEATRE PARKWAY
 STREET 2: BUILDING 41
 CITY: MOUNTAIN VIEW
 STATE: CA
 ZIP: 94043

SUBJECT COMPANY:

COMPANY DATA:

COMPANY CONFORMED NAME: Google Inc
 CENTRAL INDEX KEY: 0001288776
 IRS NUMBER: 770493881
 STATE OF INCORPORATION: DE
 FISCAL YEAR END: 1231

...

SCHEDULE 13G

Google Inc.

Class A Common Stock

Class B Common Stock

(Title of Class of Securities)

Class A Common Stock: 38259P508

Class B Common Stock: Not Applicable

(CUSIP Number)

CUSIP No. 38259P508

Names of Reporting Persons.		
1.	Lawrence Page	
2.	Check the Appropriate Box if a Member of a Group (See Instructions)	
	(a) <input type="checkbox"/>	(b) <input type="checkbox"/>
3.	SEC Use Only	
4.	Citizenship or Place of Organization	
	United States of America	
Number of Shares Beneficially Owned by Such Reporting Person With:	5.	Sole Voting Power 29,133,614 ⁽¹⁾
	6.	Shared Voting Power 0
	7.	Sole Dispositive Power 29,133,614 ⁽¹⁾

WCIKLINK_CUSIP

SEC CIK Number	Company Name	9-Digit CUSIP Number as Appears in SEC Filings of CIK Entity	8-Digit CUSIP Number as Appears in SEC Filings of CIK Entity	First Filing Date of CIK-CUSIP Combination	Last Filing Date of CIK-CUSIP Combination	Total CUSIP Matches/Hits in SEC Filings	Validation Check: 0-Invalid Link, 1-Name Mismatch, 2-Valid 8-digit CUSIP, 3-Valid Link
0000005907	AMERICAN TELEPHONE & TELEGRAPH CO	030177109	03017710	28FEB1994	28FEB1994	6	3
0000005907	AT&T CORP	001957109	00195710	28FEB1995	29FEB2000	58	3
0000005907	AT&T CORP	001957208	00195720	31MAR1999	31AUG2001	108	3
0000005907	AT&T CORP	001957307	00195730	31MAR1999	31AUG2001	24	3
0000005907	AT&T CORP	001957406	00195740	31MAY2000	31JUL2001	122	3
0000005907	AT&T CORP	001957505	00195750	28FEB2003	28FEB2006	66	3
0000048595	STARWOOD HOTELS & RESORTS	855905105	85590510	28FEB1995	30APR1998	90	3
0000048595	STARWOOD HOTELS & RESORTS	855905204	85590520	31JUL1995	31JAN2001	304	3
0000048595	STARWOOD HOTELS & RESORTS	053469102	05346910	28FEB1998	28FEB1999	4	1
0000048595	STARWOOD HOTELS & RESORTS	85590A203	85590A20	28FEB1999	28FEB2005	60	3
0000048595	STARWOOD HOTELS & RESORTS	85590A401	85590A40	28FEB2007	28FEB2011	18	3
0000706270	AMERICA WEST AIRLINES INC	023650104	02365010	31MAY1994	30SEP1994	42	3
0000706270	AMERICA WEST AIRLINES INC	023650112	02365011	30SEP1994	31MAY1998	86	3
0000706270	AMERICA WEST AIRLINES INC	023650203	02365020	30SEP1994	28FEB1997	80	3
0000706270	AMERICA WEST AIRLINES INC	023650302	02365030	30SEP1994	30SEP1994	4	3
0000706270	AMERICA WEST AIRLINES INC	023657109	02365710	31MAR1997	31MAY1998	6	1
0000706270	AMERICA WEST AIRLINES INC	023657208	02365720	31MAR1997	31DEC2001	48	1
0001288776	GOOGLE INC	38259P508	38259P50	31OCT2004	28FEB2011	248	3
0001288776	GOOGLE INC	38259P607	38259P60	29FEB2008	29FEB2008	2	3
0001288776	GOOGLE INC	14258514	14258514	31JAN2010	31JAN2010	10	0
0001288776	GOOGLE INC	13131374	13131374	28FEB2011	28FEB2011	10	0

WCIKLINK_GVKEY

Compustat Global Company Key - GVKEY	Company Name in Compustat - Header	First Date of Compustat Data	Last Date of Compustat Data	CIK Number	GVKEY-CIK Link Source	Company Name in SEC Filings - Header	First Filing Date	Last Filing Date	Number of 10-K Filings	Numbe of 10-Q Filings	Total Number of Filings	Link Flag: 0-No Link, 1-No Filings, 2-Name Mismatch, 3-Valid Link
004034	DOMTAR INC	31DEC1950	31DEC2006	0000801644	CUSIP	DOMTAR INC /FI	13FEB2006	14FEB2007	0	0	4	3
004034	DOMTAR INC	31DEC1950	31DEC2006	0000819817	COMP	DOMTAR INC /CANADA	13FEB1995	14FEB2008	0	0	20	3
004034	DOMTAR INC	31DEC1950	31DEC2006	0001381531	CUSIP	DOMTAR CORP	12DEC2006	25FEB2011	4	13	116	3
006307	SEARS HOLDINGS CORP	31DEC1950	31JAN2010	0000056824	CUSIP	KMART CORP	04FEB1994	29AUG2003	12	34	177	2
006307	SEARS HOLDINGS CORP	31DEC1950	31JAN2010	0001229206	FDATE	KMART HOLDING CORP	15MAY2003	21MAR2005	3	10	63	3
006307	SEARS HOLDINGS CORP	31DEC1950	31JAN2010	0001310067	COMP	SEARS HOLDINGS CORP	24MAR2005	25FEB2011	6	18	139	3
018284	1ST BANCORP IND	30JUN1993	30JUN1998	0000840458	COMP	FIRST BANCORP /IN/	28DEC1995	13NOV1998	4	9	21	3
018284	1ST BANCORP IND	30JUN1993	30JUN1998	0000915327	COMP		1
018284	1ST BANCORP IND	30JUN1993	30JUN1998	0001074543	FDATE	FIRST BANCORP OF INDIANA INC	17MAY1999	14MAY2008	9	30	109	2

WRDS Linking Macros

WRDS Linking Macros

a transparent, effective, and extensible solution

- Overview of linking best practices
 - Use Permanent Identifiers for **ALL** time-series analysis
 - Link primary identifiers **FIRST** by 8-digit CUSIPs whenever available
 - As a **secondary** alternative, add Exchange Ticker-Date matches
 - Company Names should be used **ONLY** to Score/Flag/Check Matches
- Linking **Macros** in the presence of permanent identifiers
 - Using CUSIP and Exchange Ticker in available “Names” Tables
 - IBES-CRSP Linking Macro: **ICLINK.SAS**
 - OptionMetrics-CRSP Linking Macro: **OCLINK.SAS**
- Linking in the absence of primary identifiers
 - Securities in Thomson-Reuters Ownership data
 - TAQ-CRSP Linking Macro: **TCLINK.SAS**

Using WRDS Linking Macros

- Invoke in one line within code. e.g.
 - IBES-CRSP Linking: `%iclink(outset=home.iclink);`
 - TAQ-CRSP Linking Macro:
`%tclink(BEGDATE=199301,ENDDATE=201012,OUTSET=home.tclink);`
- Applications of Effective Linking Concept in Transparent SAS Code: **Extensible** (e.g. *iclink* vs *oclink*)
- Flag matches and provide link accuracy metrics
- Efficient Coding that highlight best practices and runs on the fly (automatic updating and low maintenance cost)

Linking without Primary Identifiers

- TAQ: Define a primary identifier, first
 - “TICKER SYMBOL – VINTAGE DATE” as a primary identifier
 - Use CUSIP as primary linking identifier then add ticker matches
 - Link table between TAQ Ticker Symbols and PERMNO: **TCLINK.sas**
- Thomson-Reuters Holdings Data:
 - Transform CUSIPs into PERMNO, first, then use PERMNO for analysis (shares adj, trade derivations, etc...)
 - Thomson Ownership Research applications: <http://wrds-web.wharton.upenn.edu/wrds/support/Data/004Research%20Applications/003Research%20Guides/Thomson%20Reuters%2013F%20Database%20Research%20Applications.cfm>
- Create linkages and run analyses with new primary identifiers
- Merge data with this primary identifiers

TCLINK Linking Table: Example

PERMNO	8-digit CUSIP	TAQ Vintage Date	Stock Symbol in TAQ	Company Name in TAQ	Full CUSIP Number: 9-digit CUSIP + 3-digit NSCC Exchange ID	Effective Date of Current TAQ Name Record	Company Name in CRSP	0.CUSIP+Names, 1.CUSIP, 2.Ticker+Names, 3.Ticker Only
11081	24702510	30JUN2002	DELL	DELL COMPUTER CORP	247025109002	19980917	DELL COMPUTER CORP	0
11081	24702510	31JUL2002	DELL	DELL COMPUTER CORP	247025109002	20020701	DELL COMPUTER CORP	0
11081	24702510	31AUG2002	DELL	DELL COMPUTER CORP	247025109002	20020829	DELL COMPUTER CORP	0
11081	24702510	30SEP2002	DELL	DELL COMPUTER CORP	247025109001	20020903	DELL COMPUTER CORP	0
11081	24702510	31OCT2002	DELL	DELL COMPUTER CORP	247025109002	20021001	DELL COMPUTER CORP	0
11081	24702510	30NOV2002	DELL	DELL COMPUTER CORP	247025109001	20021101	DELL COMPUTER CORP	0
11081	24702510	31DEC2002	DELL	DELL COMPUTER CORP	247025109002	20021202	DELL COMPUTER CORP	0
11081	24702510	31JAN2003	DELL	DELL COMPUTER CORP	247025109001	20030103	DELL COMPUTER CORP	0
11081	24702510	28FEB2003	DELL	DELL COMPUTER CORP	247025109002	20030225	DELL COMPUTER CORP	0
11081	24702510	31MAR2003	DELL	DELL COMPUTER CORP	247025109001	20030303	DELL COMPUTER CORP	0
11081	24702510	30APR2003	DELL	DELL COMPUTER CORP	247025109002	20030415	DELL COMPUTER CORP	0
11081	24702510	31MAY2003	DELL	DELL COMPUTER CORP	247025109001	20030505	DELL COMPUTER CORP	0
11081	24702510	30JUN2003	DELL	DELL COMPUTER CORP	247025109002	20030602	DELL COMPUTER CORP	0
11081	24702R10	31JUL2003	DELL	DELL INC	24702R101002	20030723	DELL INC	0
11081	24702R10	31AUG2003	DELL	DELL INC	24702R101001	20030815	DELL INC	0
11081	24702R10	30SEP2003	DELL	DELL INC	24702R101002	20030903	DELL INC	0
11081	24702R10	31OCT2003	DELL	DELL INC	24702R101001	20031001	DELL INC	0
11081	24702R10	30NOV2003	DELL	DELL INC	24702R101001	20031128	DELL INC	0
11081	24702R10	31DEC2003	DELL	DELL INC	24702R101001	20031217	DELL INC	0
11081	24702R10	31JAN2004	DELL	DELL INC	24702R101002	20040108	DELL INC	0
11081	24702R10	29FEB2004	DELL	DELL INC	24702R101001	20040202	DELL INC	0
11081	24702R10	31MAR2004	DELL	DELL INC	24702R101002	20040316	DELL INC	0
11081	24702R10	30APR2004	DELL	DELL INC	24702R101001	20040414	DELL INC	0
11081	24702R10	31MAY2004	DELL	DELL INC	24702R101002	20040525	DELL INC	0
11081	24702R10	30JUN2004	DELL	DELL INC	24702R101001	20040602	DELL INC	0
11081	24702R10	31JUL2004	DELL	DELL INC	24702R101001	20040602	DELL INC	0
11081	24702R10	31AUG2004	DELL	DELL INC	24702R101002	20040811	DELL INC	0
11081	24702R10	30SEP2004	DELL	DELL INC	24702R101001	20040901	DELL INC	0
11081	24702R10	31OCT2004	DELL	DELL INC	24702R101001	20041025	DELL INC	0
11081	24702R10	30NOV2004	DELL	DELL INC	24702R101002	20041118	DELL INC	0
11081	24702R10	31DEC2004	DELL	DELL INC	24702R101002	20041216	DELL INC	0
11081	24702R10	31JAN2005	DELL	DELL INC	24702R101001	20050125	DELL INC	0

Using TCLINK Table

To Add PERMNO to Data from TAQ

```
proc sql;  
  create table MYTAQDATA_WITHPERMNO  
  as select b.PERMNO, a.*  
  from MYTAQDATA as a, HOME.TCLINK as b  
  where a.symbol=b.symbol  
        and intnx("month",a.date,0,"E")=b.date;  
quit;
```

WRDS Linking Solutions

- Linking **Tables** at WRDS
 - **CRSP**-Compustat Merged Product: **CCM**
 - **WRDS** DealScan Linking Table
 - **WRDS** Mutual Fund Linking Table: **MFLINKS**
 - **WRDS** CIK Linking Table: **WCIKLINK**
- **WRDS Linking Macros**: a transparent, effective, and extensible solution
 - Overview of linking best practices
 - Linking by 8-digit CUSIP
 - The Disadvantages of Exchange Ticker-Date matches
 - Limitations of Company Names Matching in SAS
 - CUSIP-TICKER Linking **Macros**
 - IBES-CRSP Linking Macro: **ICLINK.SAS**
 - OptionMetrics Linking Macro: **OCLINK.SAS**
 - Linking in the Absence of Primary Identifiers: TAQ-CRSP Linking Macro: **TCLINK.SAS**

Summary

- Link tables are more useful and easier to debug
- Understanding the data is the key to successful linking
- CUSIP/ISIN is the most effective common identifier in linking databases
- Exchange ticker is less effective and should be used with dates
- Company names should be used only to score links

WRDS Research Macros ©: Linking Macros:

1. ICLINK

Summary	Creates a link table between IBES TICKER and CRSP PERMNO and scores links from 0 (best link) to 6 .
Invocation Line	%ICLINK (IBESID=IBES.ID, CRSPID=CRSP.STOCKNAMES, OUTSET=WORK.ICLINK) ;
Example	%ICLINK;
SAS Code	
Usage Notes	

2. OCLINK

Summary	Creates a link table between OptionMetrics SECID and CRSP PERMNO, using common CUSIP, and TICKER identifiers and scoring the links using company names
Invocation Line	%OCLINK (OPTIONMID=OPTIONM.SECNMD, CRSPID=CRSP.MSENAMES, OUTSET=WORK.OCLINK) ;
Example	%OCLINK (outset=home.TCLINK);
SAS Code	
Usage Notes	Make sure to specify the optionm and crsp libraries first, using the libname statement.

3. TCLINK

Summary	Create a link table between TAQ SYMBOL and CRSP PERMNO, using TAQ SYMBOL and Vintage Date combination as primary and unique identifier for TAQ securities, in the absence of primary key in TAQ data
Invocation Line	%TCLINK (BEGDATE= 199301 , ENDDATE= 201012 , OUTSET=WORK.TCLINK) ;
Example	%TCLINK (outset=home.TCLINK);
SAS Code	
Usage Notes	Make sure to initiate the taq and crsp libraries first, using the libname statement. The date range should include only the time period of TAQ datasets with valid subscription and access permissions.

Linking Databases – Part 2

Summer 2011

- “Alternative Matching Methods” using Unconventional Secondary Identifiers
 - Multi-Dimensional Identifiers: Price time-series, historical names, addresses, & fundamental information
 - Compustat-CRSP Linking Macro: CCLINK.SAS
- WRDS Research Macros
 - Standardized SAS routines frequently used by researchers in Finance and Accounting to perform common empirical procedures that are likely to be a part of any research project
 - Transparent, effective, and extensible solution for empirical research in finance and accounting
 - 30+ macros including several linking macros
- Mutual Fund Historical CIK Links
- Historical CIK-Ticker Links