QE1 FAST REFERENCE SHEET

**Econ**

- **Major assumptions of the mainstream economic model:** rational actors, perfect information, budget constraints and indifference curves, consistent preferences, utility maximization, diminishing returns
- **Substitution and income effect for consumers; output and income effects for firms**
  - Consumers choose bundle of goods where \( MRS = \frac{p_1}{p_2} \); Firms choose bundle of inputs where \( RTS = \frac{w}{v} \)
  - **Elasticity** Price or demand elasticity = \% change in \( Q \)/\% change in \( p \); Supply elasticity=\%change in \( Q \)/\%change in \( p \); Income elasticity=\%change in \( Q \)/\%change in \( Y \)
- **Profits**=Revenue-Costs or \( p \cdot Q - TC \)
- Firms shut down if \( p < SAVC \)
- Firms choose labor quantity at \( w = p \cdot MPL \) and choose capital quantity at \( v = p \cdot MPK \)
- Cash is more efficient than in-kind transfers or subsidies
- **Sales taxes**=**production taxes** if supply and demand have same elasticities. If not, get shifted on to most inelastic. **Wage taxes are inefficient**
- **Consumer surplus**—area under demand curve and above price level; **Producer surplus**—area above supply curve and under price level
- **Different behavior of price-taking and price-influencing firms:** produce where \( MR = MC = p \) (price-takers); produce where just \( MR = MC \) and price is found by taking that quantity up to the \( D \) (AR) curve (price-influencers)
- **Monopoly and Imperfect Competition** Monopolies set \( p \) too high and \( Q \) too low; monopolies don’t have to make profits; efficient quantity would be to produce where \( MC = D \) (AR) but monopolies often can’t produce the efficient \( Q \) and be profitable; monopolist \( MR = p[1+1/E^{\partial}] \)
- **Monopsony**
- **Duopoly**
- **Game Theory and Equilibriums**
- **Public Goods** produce where \( SMB = SMC \). \( SMB \) equals sum of individual MB (D) curves based on prices they “would be willing to pay.”
- **Externalities** Goods that have bad externalities will be over-produced and under-priced by market; Goods that have good externalities will be under-produced and over-priced; Have to be fixed with taxes (bad externalities) or subsidies (good externalities) to produce where \( SMB = SMC \)
- **Short-run vs. long-run**
- **Risk and Insurance:** Utility is higher when risk can be eliminated; certainty equivalent is max you will pay to eliminate risk. Efficient premium would be \( p \cdot L \). Cost of risk =\( E(C) - CE \) (measured on y axis)
- **Overall economic efficiency requires the economy to produce where** \( RPT = MRS \)
Stats

- Test Statistics

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<th>Normal</th>
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<td>Is mean different from/the same as some number?</td>
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<td>Is there a relationship between x and y (model utility test)</td>
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Rejection region: +1.96 for two-sided; +1.645 for one-sided
If n<100, use t with n-1 df

- One or two-tailed? Remember to double p-values for two-tailed tests.

  $\mu \geq \text{some number}$

  $\mu \leq \text{some number}$

  $\mu \neq \text{some number}$

- Confidence Intervals

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<tr>
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<th>Two-Sided CIs</th>
<th>One-Sided CIs</th>
<th>Difference of Mean CIs</th>
<th>Regression Coefficient CIs</th>
<th>CI for y in regression</th>
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- If n<100 use $t_{0.025}$ or $t_{0.05}$ with n-2 df instead of 1.96, etc.
- Proportions: use
• Margin of error=part after ±
• To find sample size that will give a particular margin of error, \( n = \left(\frac{1.96 \times o}{e}\right)^2 \)

• Variance, standard deviation, and standard error

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- **Interpreting Regressions:** A one [x-unit] increase in [x variable] is associated on average with an estimated [coefficient on x variable] [y unit] [increase/decrease] in [y variable], controlling for [all other x variables.] Note that for ln-ln regressions (elasticities), the units are percentages.

- **Interpreting Coefficients:** See also exam notes.
  - X and y natural units: a one unit increase in x is associated with a [x coefficient] increase/decrease in y…..
  - X and y logs: a one percent increase in x is associated with a [x coefficient] percent increase/decrease in y…
  - X in natural units, y in logs: a one unit increase in x is associated with a [x coefficient *100] increase/decrease in y…..
  - Statistical significance: divide coefficient by standard error and check t table for n-1 d.f. In general, if t is greater than or equal to 2, coefficient is significant. A coefficient of 0 means no relationship between x and y.

- **Dummy variables:** Income=11,000 + 1500 (yrs of ed)-2000 (female). 1 if female, 0 if not. Means that controlling for other variables females make 2,000 less.

- **Interaction variables:** Says that the effect of a change in \( x_1 \) on y depends on a third variable \( x_2 \). Test if the interaction effect exists by t-testing interaction variable coefficient. Income= 11,000 + 1500 (yrs of ed)-2000 (female) -1000 (AA) + 500 (female * AA). Female *AA means that if you are female and African American, controlling for other variables, you make $2,500 less. Compensation for being female and AA, you don’t get dinged full amount. ln income=.15 (yrs of ed) -.29 (female)-.04 (female *ed). Female*ed means that females receive 4% less for each additional year of education than men.

- **Categorical variables:** Dummy variables with more than two categories. One category is omitted, and all dummies are interpreted relative to the omitted category. (see exam notes and Laity handout)
- **R^2** is percent of the total variation in y explained by the regression model.
- **Non-linear regression** means that the change in y caused by a change in x depends on what the value of x was in the first place.
- **Omitted variable bias**: failing to include variables that are strongly correlated with one of your x variables and the error term, and may have some explanatory power for y. OVB could cause a coefficient to be too large or small. Example: coke and swimming causing polio. Know you have it when adding the omitted variable changes a coefficient on another variable to change.
- **Multicollinearity** two or more regressors are highly correlated with each other. Causes large SEs, low t statistics, imprecise coefficient estimation, but doesn’t destroy model. Perfect multicollinearity destroys model, happens when one regressor is a linear function of another regressor, which makes it impossible to move one regressor while holding the others constant.
- **Simultaneous causality or wrong direction causality**
- **Selection bias** Especially likely to happen when using variables people select for (marriage, college attendance) or collecting data from a source people select into (people with jobs)
- **Mis-specified model** Is it linear/non-linear, interactions, dummies?
- **Is the model externally valid** i.e. does it apply to more general situations
- **F-tests**: Are multiple coefficients equal to 0? See exam notes.
- **Z test vs. t test**: Z if over 30, know the variance, and distribution is normal.
- **One-tailed vs. two-tailed**: not equal, different from means two-tailed; greater or less than means one-tailed
- **Hypothesis Tests**: (1) Figure out if it’s proportions or means (2) Decide which test to do and if it’s one or two-tailed (3) State your hypotheses (4) Figure out where your rejection region is (5) Calculate your test statistic (6) Reject or accept H_0 and explain what that means in English.
- **Remember the difference between statistical significance and practical significance**
- **Matched/Paired Data** Different H-tests and CIs
- **Small samples have higher variances.**
- **It is dangerous to extrapolate beyond the range of your data.** This is especially true when interpreting the constant in a regression. Do you actually have data points where all the x vars are 0?
- **Type I/II errors**

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<th>Reject H_0</th>
<th>Fail to Reject H_0</th>
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<tr>
<td>H_0 Really True</td>
<td>Type I error (alpha, significance)</td>
<td>Correct</td>
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<tr>
<td>H_0 Really False</td>
<td>Correct</td>
<td>Type II error (beta, power)</td>
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We unconsciously favor ingroup members and denigrate outgroup members. We often define groups by race. Can be eased with positive, egalitarian group projects that require cooperation.

People are asymmetrically loss averse. Certainty effect—we will pay more to eliminate a risk than just to reduce it. Prospect theory: people will risk greater losses for small chance of no loss at all, but will accept small gain rather than risk it for bigger gains. People lump losses together (less painful) and think of gains separately.

Endowment and commitment effects—we value what we own more than we would if we didn’t own it, and we think something we’ve committed to doing is more worthwhile than if we hadn’t. We stop seeking disconfirming evidence after buying or committing to something because we fear regret.

People compare things to an “anchor” and adjust from there.

How issues are framed and which mental accounts are activated lead to different behaviors.

People don’t consumption smooth—consumption is sensitive to current income and which mental account expenses are credited to (income, assets, future income.)

People are not perfectly rational, but boundedly rational. They lack perfect information and suffer from everything listed in this section. (Bazerman)

Status quo bias is a restraining force. Why the default option is so powerful. Familiarity bias—things that are familiar are positive.

Self-serving bias: what is best for me must be moral and fair (Bazerman)

Public opinion: people have true attitudes, but not about everything. True attitude is central tendency, but deviation can be manipulated by surveyors. Question wording, ordering, and response options can all cause biases.

Association bias: If something is associated with something good, it must be good too.

Measuring public good value is nearly impossible—people reject putting a dollar value on public goods, people over-estimate what they would be willing to pay; contingent valuation should be seen as an attitude statement not a real economic preference

Social proof heuristic: what others do must be right, especially if we are uncertain of what to do and/or the people doing it are similar to us (Cialdini)

Situationalism and the fundamental attribution error—much behavior is dictated by situational forces, not personality. People tend to blame personalities or situation depending on whether outcome is good or bad and if they like the person involved; tend to underestimate power of situation in general.

Hyperbolic discounting and intertemporal choice—people underestimate the impact today’s choices will have on tomorrow’s opportunities. Discount gains at higher rate than losses. Want good things now and bad things later. Preferences are inconsistent across time—have both long-term and short-term preferences, often in conflict.
• **People behave in ways that produce self-fulfilling prophecies or expectancy confirming behavior in others.** We make a choice and then find reasons/arguments that support it, not the other way around.

• **Channel factors turn intentions into actions.**
  
  **Automaticity**—Much behavior is automatic and unconscious, and decided by heuristics/situational trigger factors. Most likely to use automaticity when (1) outcome is less important to you (2) you don’t have time/info/etc to be systematic. Dual process—we use some combination of automatic and controlled thinking most of the time but even our controlled thinking is biased by automatic heuristics.

• **Reciprocity** Get people to do what we want by doing something small for them first

• **We want to appear consistent.** If I can get you to make an initial commitment, your desire to appear consistent will keep you on that path and deepen your commitment.

• **People care about procedural justice.** Can provide it by giving people voice/participation opps, neutral decision-makers, treating respectfully. Is fairly costless.

• **Positive illusions** about ourselves and our group.

• **Authority heuristic** We do what authority figures tell us to automatically

• **Liking heuristic** We do what those we like ask us to do automatically

• **Scarcity heuristic** What is scarce must be valuable

• **Actuarial methods produce better outcomes than human judgment methods, because of human biases.** (Dawes)

• **Cognitive dissonance can cause attitude change:** Getting people to perform some action that is inconsistent with their prior beliefs will cause dissonance. People will change attitude to resolve dissonance, so long as there is insufficient external justification for the behavior. Works best when dissonance threatens self-esteem, a significant commitment has been made to one of the opinions through effort or irrevocability

• **People mis-perceive probabilities.** Tend to under-weight bad outcomes, over-weight good outcomes. Availability heuristic—judge probabilities by how easily we can recall instances of it, but mental availability may be biased. Representativeness heuristic—we think our set of recallable experiences is representative of reality, but may be skewed.

• **We ignore the tendency to regress to a mean.** See order where there is none.

• **More choice isn’t always good.** Can be bad unless there are many heterogeneous needs that more choice can satisfy and people have expertise to choose (Lowenstein)

• **People employ irrational coping mechanisms to make decisions under stress.**

• **Principal/agent problems** can be solved by sharing information, developing incentives/punishments to align interests

• **Voluntary compliance (buy-in) is better than coercion:** more stable and long-lasting
• Group identity or solidarity will lead to higher rates of selfless group cooperation.

**Politics**

• **Leaders should take ownership of issue:** don’t try to shift blame, take responsibility for problem and policy solution, clearly explain what you’re doing and why you’re doing it

• **Use rhetorical leadership (political symbolism) and coalition-building strategies to win support for policies.** Maintain open communication within coalition and make sure groups respect each other’s turf.

• **Transactional v. transformational leadership; wandering manager**

• **Choose the right implementation strategy:** bottom-up or top-down? Make implementation guidelines clear, detailed, and simple.

• **Get the results you want from the bureaucracy:** principal agent problems (workers have different interests/incentives than boss and worker preferences are most important determinant of outcomes). Define critical task correctly. Make sure workers have the right amount of flexibility and freedom. Diagnose resistance properly: parochial self-interest, misunderstanding, differing assessments, or low tolerance for change? Tailor your strategy to the type of resistance and situational factors. adverse selection (hiring wrong workers because of imperfect information.) importance of bureaucratic culture. Difficulty of measuring bureaucratic output and goals.

• **Bureaucracies don’t perform multiple, disparate tasks well unless there is no dominant culture.**

• **Be prepared for opposition.** Oppo groups form when actors have much at stake, benefits are greater than costs of oppo, limited alternatives. Can change people’s cost/benefit calculation of group membership by providing selective incentives (like AAA.) Advocacy groups can be difficult to negotiate with but also less effective because maintained by commitment to ideological purity—may prefer being right to winning. Heavily volunteer advocacy groups can be very ineffective.

• **Keep and build your external constituency (most important) and internal constituency (subordinates.)** External support gives you freedom with the bureaucracy.

• **Be aware of gender issues.**

• **Use NGOs to build international partnerships where states lack will or capacity to do so.**

• **Assume the ethical high ground.** Rights-based v. utilitarianism.

• **Use deliberative processes where possible and engage civil society:** produces consensus, compromise, buy-in through reciprocity; particularly good for resolving moral issues

• **Build state capacity:** Important links between vibrant civil society, economic success, and state capacity. Capacity depends on bureaucratic institutions, technical and administrative skills, political viability. Build capacity through direct representation, plurality, independent bureaucracy, rule of law not personality, deal effectively/fairly with opposition.