PAGE ONE Economics

CLASSROOM EDITION

Smoothing the Path: Balancing Debt, Income, and Saving for the Future

November 2014

An informative and accessible economic essay with a classroom application.

Includes the full version of the **Page One Economics Newsletter,** *plus questions for students and an answer key for classroom use.*

Common Core Standards (see page 12)

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Scott A. Wolla
Economic Education Group of the Federal Reserve Bank of St. Louis

Smoothing the Path:
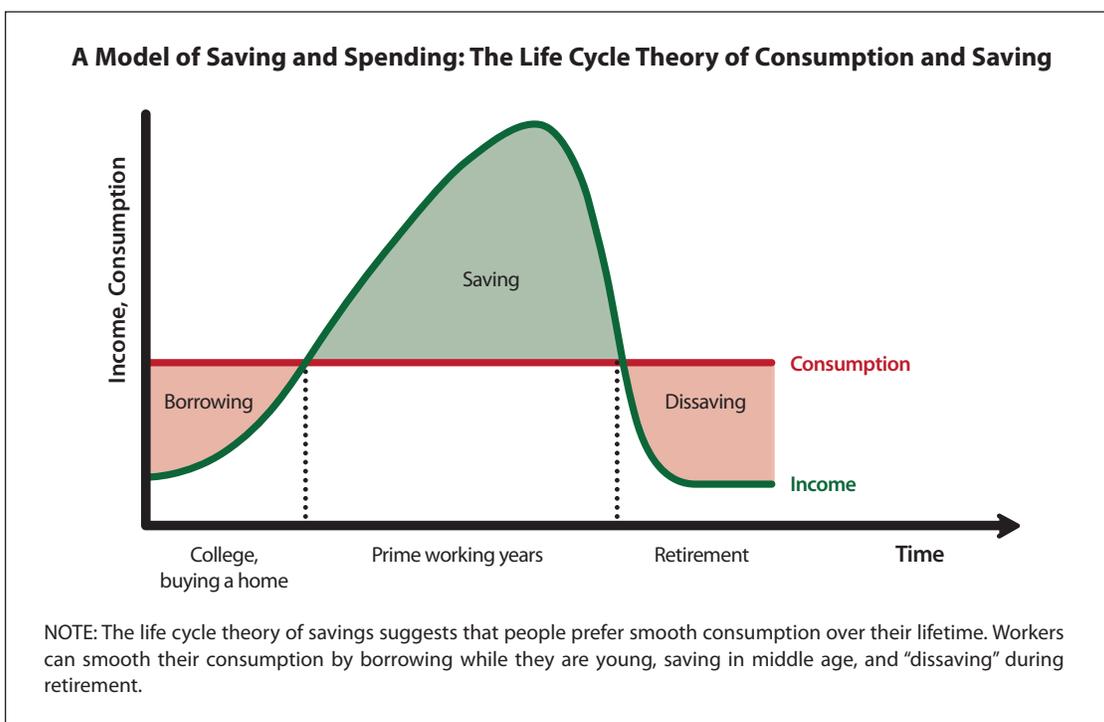# Balancing Debt, Income, and Saving for the Future

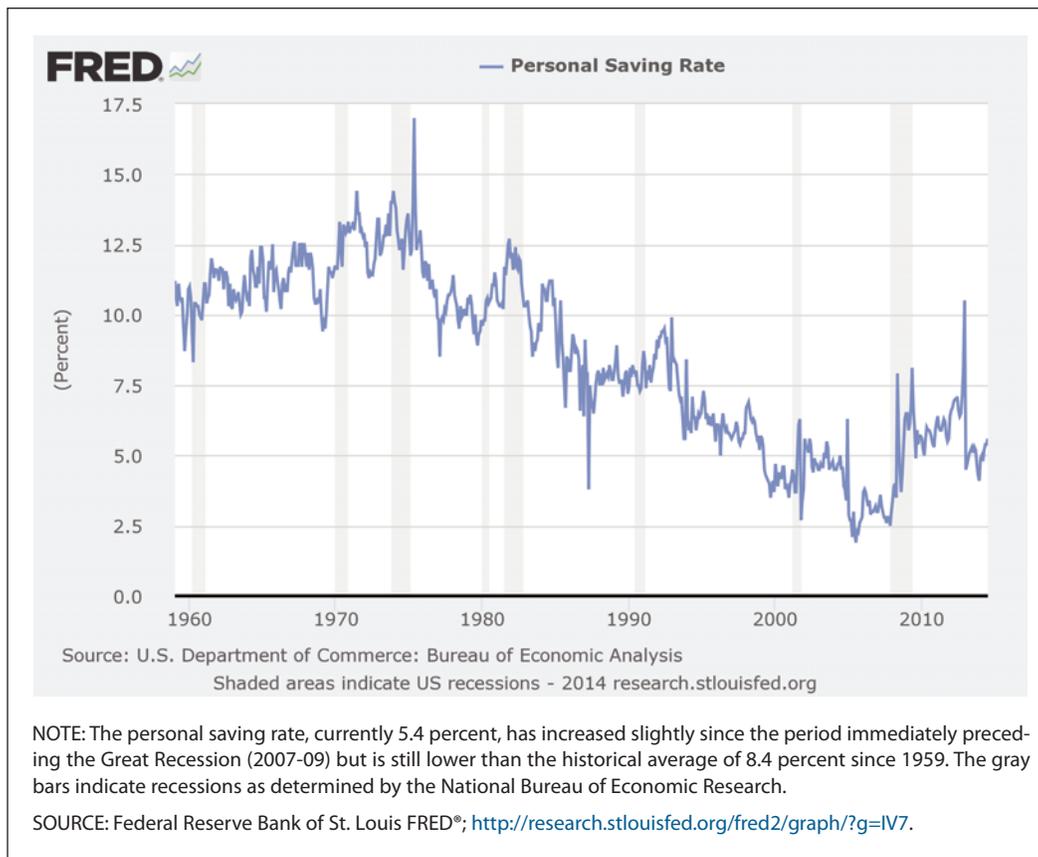**Scott A. Wolla,** *Senior Economic Education Specialist*

Annual income twenty pounds, annual expenditure nineteen [pounds] nineteen [shillings] and six [pence],
result happiness. Annual income twenty pounds, annual expenditure twenty pounds ought and six, result misery.
—Mr. Micawber, from David Copperfield, by Charles Dickens

Consumption Smoothing

The "life cycle" theory of consumption and saving was pioneered by Franco Modigliani, winner of the 1985 Nobel Prize in economics. The theory is a common model used by economists to describe people's overall saving and spending behaviors. Most people's lifetime income follows a hump-shaped pattern: Income is lower when they are young, income rises (and peaks) during middle age, and income falls again during retirement. If consumption matched income, then consumption would have a hump shape as well. That is, people would consume few goods and services when they are young, consume a great deal when middle aged, and again consume very little after they retire. However, in reality, most people prefer a smoother consumption pattern over their lives, as shown in the first figure.

A Model of Saving and Spending: The Life Cycle Theory of Consumption and Saving

NOTE: The life cycle theory of savings suggests that people prefer smooth consumption over their lifetime. Workers can smooth their consumption by borrowing while they are young, saving in middle age, and "dissaving" during retirement.

NOTE: The personal saving rate, currently 5.4 percent, has increased slightly since the period immediately preceding the Great Recession (2007-09) but is still lower than the historical average of 8.4 percent since 1959. The gray bars indicate recessions as determined by the National Bureau of Economic Research.

SOURCE: Federal Reserve Bank of St. Louis FRED®; http://research.stlouisfed.org/fred2/graph/?g=lV7.

When people are young, they make up the difference between their preferred consumption and their relatively low income by borrowing. For example, this allows (i) students to go to college using college loans and (ii) new workers in the labor force to buy housing using mortgage loans. During middle age, income rises above preferred consumption, and the model suggests that people limit current consumption to pay off student loans and mortgage debt (among other debt) and save for retirement; this is the accumulation or saving phase. During retirement, when income falls, people **dissave** by spending their retirement savings. Thus, both borrowing and saving help smooth consumption over time.

The life cycle model assumes that people prefer smooth consumption over time, can reasonably estimate their income, and can plan their savings and consumption patterns to achieve a smooth consumption pattern over decades. However, evidence suggests that people do not save enough during peak earning years. Generation Xers (those born between 1965 and 1980 and currently middle aged) carry larger debt levels than other cohorts at similar stages—that is, at times when they should be paying down debt and saving for retirement.[1] Forecasts show that both baby boomers (those born between 1946 and 1964) and Generation Xers will likely have lower retirement incomes than those born in the 1930s and 1940s.[2]

Types of Retirement Plans

For workers with a defined *benefit* retirement plan (a pension), employers promise a specific monthly retirement payment that is predetermined by a formula, often based on the employee's income, years of service, and age at retirement. Because employees automatically participate in this type of plan and retirement payments are fixed, these programs set the retirement planning process on autopilot for many workers.

In a defined *contribution* plan (say a 401(k) plan), employees contribute money to their own retirement accounts and employers often match part of their contribution. The money in the account belongs to the future retiree. This type of plan requires employees to make more decisions, such as how much to save and which financial investments to use. The value of the holdings in a defined contribution plan will fluctuate based on the investment earnings.

There has been a rapid transition from defined benefit to defined contribution retirement plans. In 1980 about 40 percent of private-sector pension contributions flowed into defined contribution plans; by 2000 almost 90 percent flowed into these plans.[1] Because employees make these decisions for themselves, a higher degree of financial literacy is needed. Unfortunately, research consistently shows that a large portion of Americans are not financially literate and do not understand essential financial concepts such as how inflation and compound interest might affect their financial well-being.[2]

NOTES

[1] Poterba, James M.; Venti, Steven F. and Wise, David A. "The Changing Landscape of Pensions in the United States," in Annamaria Lusardi (ed.), *Overcoming the Saving Slump: How to Increase the Effectiveness of Financial Education and Saving Programs*. Chap. 1. Chicago: University of Chicago Press, 2008, pp. 17-46.

[2] Lusardi, Annamaria; Mitchell, Olivia S. and Curto, Vilsa. "Financial Literacy among the Young." *Journal of Consumer Affairs*, Summer 2010, 44(2), pp. 358–80; Lusardi, Annamaria and Mitchell, Olivia S. "The Outlook for Financial Literacy," in Olivia S. Mitchell and Annamaria Lusardi (eds.), *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*. Chap. 1. New York: Oxford University Press, 2011, pp. 1-15.

Retirement Savings

While Social Security can provide a foundation of retirement income for many people, in order to have smooth consumption, the life cycle model assumes people save for retirement during their earning years. Many people think of saving as money deposited in a savings account, but **saving** is simply money not spent on current consumption or taxes. People can save by leaving money in a drawer, depositing in a savings account, or investing in stocks and bonds. It may be helpful to think of saving as giving up some current consumption in exchange for future consumption—in other words, saved money is set aside for future spending. This implies there is a **trade-off**—more saving requires less spending on current consumption. Saving allows people to have higher future consumption.

Americans are currently saving less than they have historically (see the second figure). Specifically, 38 million working-age households (45 percent) do not have enough assets set aside for retirement.[3] And both those with high incomes and low incomes save very little. In fact, recent research finds that the primary determinant of wealth differences at retirement is not income but the choice to save or spend while young.[4] Saving while young allows savers to take advantage of **compound interest**, which allows exponential growth of their money over time. And since more time means more growth, starting to save early makes a big difference.[5]

The Importance of Financial Literacy

Financially knowledgeable people are more likely to own financial assets. However, when consumers make their own decisions, they need a higher level of financial literacy. Greater financial literacy can reduce the high levels of wealth inequality.[1] Although overall financial literacy is generally poor, knowledge of financial assets is especially dismal.[2] Financial literacy also affects willingness to invest in financial markets—the less financially literate invest less in the stock market,[3] and the level of economic education has been shown to be a strong determinant in willingness to invest in the stock market.[4] For example, it has been estimated that U.S. investors could save $100 billion by using passive index investing,[5] a strategy that uses mutual funds that mirror a market index rather than active management (and more fees) to "beat" the market.[6] Passive index investing is an investment strategy many economists consider beneficial to investors.[7]

NOTES

[1] Lusardi, Annamaria; Michaud, Pierre-Carl and Mitchell, Olivia S. "Optimal Financial Knowledge and Wealth Inequality." NBER Working Paper No. 18669, National Bureau of Economic Research, January 2003; http://www.nber.org/papers/w18669.

[2] Lusardi, Annamaria and Mitchell, Olivia S. "The Economic Importance of Financial Literacy: Theory and Evidence." *Journal of Economic Literature*, March 2014, *52*(1), pp. 5-44.

[3] Cocco, João F; Gomes, Francisco J. and Maenhout. Pascal J. "Consumption and Portfolio Choice over the Life Cycle." *Review of Financial Studies*, Summer 2005, *18*(2), pp. 491-533.

[4] Christiansen, Charlotte; Joensen, Juanna Schröter and Rangvid, Jesper. "Are Economists More Likely to Hold Stocks?" *Review of Finance*, 2008, *12*(3), pp. 465-96.

[5] French, Kenneth R. "Presidential Address: The Cost of Active Investing." *Journal of Finance*, August 2008, *63*(4), pp. 1537-73.

[6] See note 4.

[7] In a November 2013 poll of economic experts, 59 percent agreed that "an equity investor can expect to do better by choosing a well-diversified, low-cost index fund than by picking a few stocks." See "Diversification." *IGM Forum* (blog), Initiative on Global Markets, November 20, 2013; http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV_6QNgG8yRbliIY0t.

Workers can often save for retirement through their employer, typically through a defined benefit retirement plan (also known as a pension plan) and/or a defined contribution plan (such as a 401(k) plan). (See the "Types of Retirement Plans" boxed insert.) However, employees make more decisions with defined contribution plans, which requires more financial knowledge (see "The Importance of Financial Literacy" boxed insert). When employees retire (unless they buy an annuity), they themselves decide how quickly to spend the money accumulated in the account. If they draw down the account too quickly, they risk outliving their retirement savings.

Conclusion

The life cycle model shows that saving for the future requires people to limit consumption during their working years and save so they will have a "nest egg" to draw on during retirement. Recent changes in how people save for retirement have shifted some responsibility from firms to individuals. Unfortunately, households are not saving enough for retirement. Two lessons emerge: Saving while young is important, and making the right savings and consumption decisions makes a difference. Financial literacy has always been important to achieve these financial goals, and its importance seems to be growing. ∎

NOTES

[1] Emmons, William and Noeth, Bryan. "Despite Aggressive Deleveraging, Generation X Remains 'Generation Debt.'" Federal Reserve Bank of St. Louis *In the Balance*, August 2014, Issue 9; http://www.stlouisfed.org/publications/itb/articles/?id=2541.

[2] Emmons, William and Noeth, Bryan. "The Economic and Financial Status of Older Americans: Trends and Prospects." Working paper, Center for Household Financial Stability, Federal Reserve Bank of St. Louis, April 18, 2014; http://www.stlouisfed.org/household-financial-stability/assets/Emmons-and-Noeth-Older-Americans-Trends-and-Prospects-30Apr2014.pdf.

[3] Rhee, Nari. "The Retirement Crisis: Is It Worse Than We Think?" National Institute on Retirement Security, June 2013; http://www.nirsonline.org/storage/nirs/documents/Retirement%20Savings%20Crisis/retirementsavingscrisis_final.pdf.

[4] Venti, Steven F. and Wise, David A. "The Cause of Wealth Dispersion at Retirement: Choice or Chance?" *American Economic Review*, May 1998, *88*(2), pp. 185-91.

[5] Those who do not understand the exponential nature of compound interest tend to borrow more and save less. For more information, see Stango, Victor and Zinman, Jonathan. "Exponential Growth Bias and Household Finance." *Journal of Finance*, December 2009, *64*(6), pp. 2807-49.

GLOSSARY

Compound interest: Interest computed on the sum of the original principal and accrued interest.

Dissaving: To consume more than income; essentially, the opposite of saving.

Saving: Not spending on current consumption or taxes. Saving involves giving up some current consumption for future consumption.

Trade-off: Giving up some of one thing in order to gain some of something else.

Federal Reserve Bank of St. Louis *Page One Economics Newsletter*:
"Smoothing the Path: Balancing Debt, Income, and Saving for the Future"

After reading the article, answer the following questions.

1. **Describe the key concepts of consumption smoothing by completing the table below.**

Life stage	How is consumption smoothed?	If not smoothed, would consumption be higher or lower?
Young		
Middle age		
Old age/retired		

2. **What trade-off does saving present?**

3. **The life cycle model suggests that people will smooth consumption by saving for retirement. Does the evidence show that people are saving enough?**

4. **What is the benefit of saving?**

Teacher's Guide

Federal Reserve Bank of St. Louis *Page One Economics Newsletter*:
"Smoothing the Path: Balancing Debt, Income, and Saving for the Future"

After reading the article, answer the following questions.

1. **Describe the key concepts of consumption smoothing by completing the table below.**

Life stage	How is consumption smoothed?	If not smoothed, would consumption be higher or lower?
Young	To keep consumption smooth, young workers borrow money to attend college and buy homes (among other things).	If not smoothed, consumption would be lower during this period.
Middle age	To keep consumption smooth, middle-aged workers pay down debt and save a portion of their income for retirement.	If not smoothed, consumption would be higher during this period.
Old age/retired	To smooth consumption, retired workers spend money they saved while they were younger.	If not smoothed, consumption would be lower during this period.

2. **What trade-off does saving present?**

   More saving requires less spending on current consumption.

3. **The life cycle model suggests that people will smooth consumption by saving for retirement. Does the evidence show that people are saving enough?**

   The evidence shows that people are not saving enough. The personal saving rate is lower than the historical average. Those who are currently middle-aged, Generation Xers, are carrying higher levels of debt than their older cohorts and will likely have lower retirement incomes. In addition, 38 million households (45 percent) do not have enough assets set aside for retirement.

4. **What is the benefit of saving?**

   Saving while young allows savers to take advantage of compound interest, which allows exponential growth of their money over time.

For Further Discussion

Review the following or distribute the handout to your students; then lead a classroom discussion on the benefits of compound interest.

Interest is money paid to customers for keeping their money at a bank. More specifically, interest is the price of using someone else's money. When people deposit their money at a bank, the bank uses the money to make loans to others. Banks earn interest on the loans they make to consumers. In return, the bank pays interest to account holders.

It is important to understand the difference between two types of interest: simple and compound:

- **Simple interest** is the money earned on the principal, or deposit. So, imagine you have a $1,000 deposit in an account that earns 5 percent interest. In one year you would earn $50. Simply speaking, you would earn $50 per year on your $1,000 deposit.

- **Compound interest** is computed on the sum of the original principal and accrued interest. It is a key factor to building wealth over time. If you leave earned interest in the account, it is added to the principal, so it also earns interest. In this case, in the second year, you would be earning 5 percent on $1,050, not on $1,000. Your interest is compounding, and over time this can make a big difference.

View the No Frills Money Skills: Growing Money—Compound Interest (Episode 1) video to further develop the concept of compound interest (http://www.stlouisfed.org/education_resources/no-frills-money-skills/episode-1-growing-money/).

After viewing the video, lead a discussion using the following questions.

1. Why is it important to save sooner rather than later?

   Because interest is earned on principal and interest, the longer the money and interest stay in the account, the larger the amount on which interest is paid becomes, resulting in a larger interest payment over time.
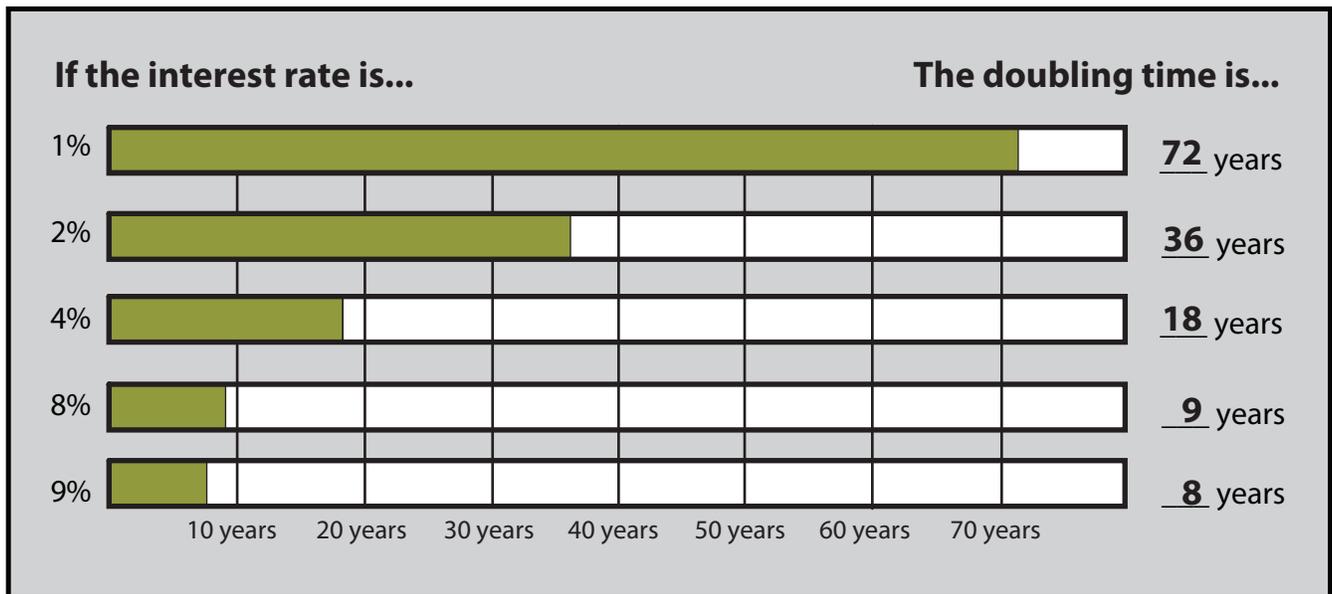
2. What does it mean to "pay yourself first"?

   Saving can be difficult. One way to increase the likelihood of saving is to pay yourself first. This means you should treat your regular savings deposit with the same importance as a bill you must pay. But in this case, you are paying yourself. You can do this by having the money directly deposited from your paycheck into a savings account each pay period.

The Rule of 72

The rule of 72 is a handy tool for estimating how long it will take for a deposit to double in value given a certain rate of return or interest rate. It also reveals the power of compound interest over time. To estimate the doubling time, simply divide 72 by the interest rate. For example, 72 ÷ 3 = 24. This means that a deposit that earns a 3 percent interest rate (or rate of return) will double in approximately 24 years.

Complete the grid by shading the bars to illustrate how long it will take your savings to double at each interest rate, and then fill in the blank to indicate the doubling time. (Answer key below)

If the interest rate is...							The doubling time is...
1%							**72** years
2%							**36** years
4%							**18** years
8%							**9** years
9%							**8** years
	10 years	20 years	30 years	40 years	50 years	60 years	70 years

Imagine you are 22 years old and a new college graduate with a deposit of $10,000. You plan to save the $10,000 for retirement (in approximately 40 years).

3. **How many times would your deposit double at 2 percent interest (rate of return)?**

   The rule of 72 estimates that the deposit would double in 36 years, so in 40 years, it would double once.

   - **How much would your balance be at retirement?**

     If your $10,000 deposit doubled in value once, your balance would be over $20,000.

4. **How many times would your deposit double at 4 percent interest (rate of return)?**

   The rule of 72 estimates that the deposit would double in 18 years, so in 40 years, it would double twice.

   - **How much would your balance be at retirement?**

     If your $10,000 deposit doubled twice, your balance would be over $40,000.

5. **How many times would your deposit double at 9 percent interest (rate of return)?**

   The rule of 72 estimates that the deposit would double in 8 years, so in 40 years, it would double five times.

   - **How much would your balance be at retirement?**

     If your $10,000 deposit doubled five times, your balance would be approximately $320,000.
     More specifically, $10,000 doubling five times is
     $10,000 × 2 = $20,000 × 2 = $40,000 × 2 = $80,000 × 2 = $160,000 × 2 = $320,000.

6. **What difference did the higher interest rate (rate of return) make?**

   The higher return means that the money doubles at a faster rate, which means it doubles more times in the 40-year time period. This makes a big difference in the final balance.

Handout

Name_____ Period_____

Interest is money paid to customers for keeping their money at a bank. More specifically, interest is the price of using someone else's money. When people deposit their money at a bank, the bank uses the money to make loans to others. Banks earn interest on the loans they make to consumers. In return, the bank pays interest to account holders.

It is important to understand the difference between two types of interest: simple and compound:

- **Simple interest** is the money earned on the principal, or deposit. So, imagine you have a $1,000 deposit in an account that earns 5 percent interest. In one year you would earn $50. Simply speaking, you would earn $50 per year on your $1,000 deposit.

- **Compound interest** is computed on the sum of the original principal and accrued interest. It is a key factor to building wealth over time. If you leave earned interest in the account, it is added to the principal, so it also earns interest. In this case, in the second year, you would be earning 5 percent on $1,050, not on $1,000. Your interest is compounding, and over time this can make a big difference.

View the No Frills Money Skills: Growing Money—Compound Interest (Episode 1) video to further develop the concept of compound interest (http://www.stlouisfed.org/education_resources/no-frills-money-skills/episode-1-growing-money/).

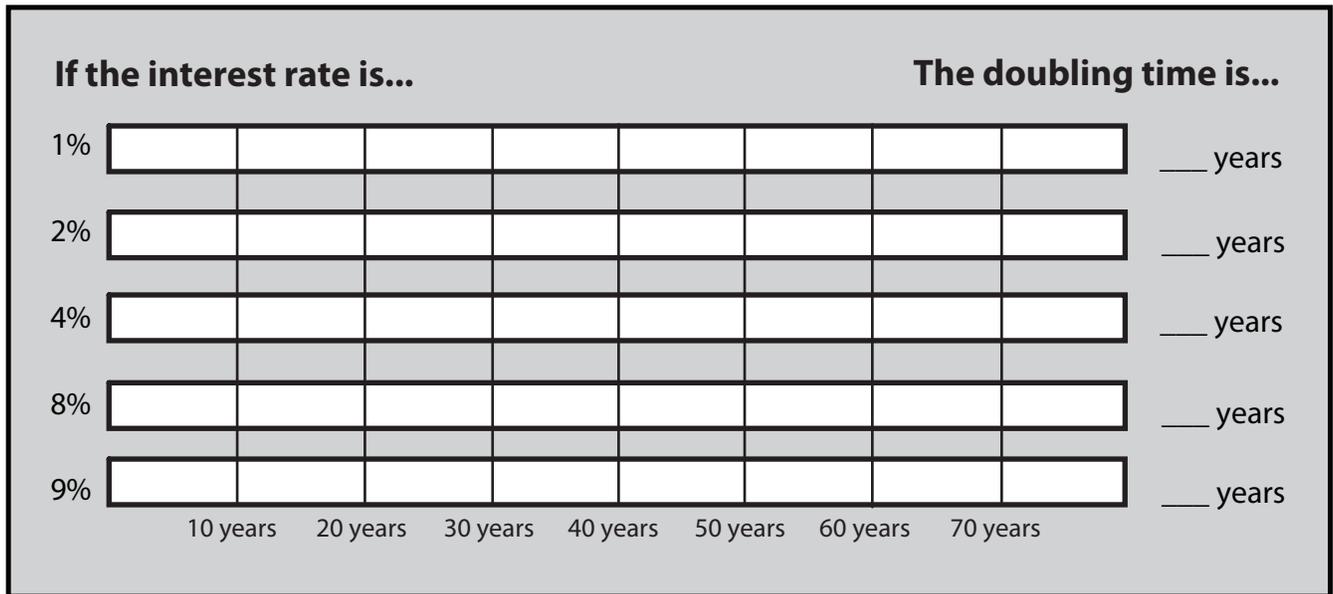**After viewing the video, answer the following questions.**

1. Why is it important to save sooner rather than later?

2. What does it mean to "pay yourself first"?

The Rule of 72

The rule of 72 is a handy tool for estimating how long it will take for a deposit to double in value given a certain rate of return or interest rate. It also reveals the power of compound interest over time. To estimate the doubling time, simply divide 72 by the interest rate. For example, 72 ÷ 3 = 24. This means that a deposit that earns a 3 percent interest rate (or rate of return) will double in approximately 24 years.

Complete the grid by shading the bars to illustrate how long it will take your savings to double at each interest rate, and then fill in the blank to indicate the doubling time.

If the interest rate is...   **The doubling time is...**

1%								___ years
2%								___ years
4%								___ years
8%								___ years
9%								___ years

10 years　20 years　30 years　40 years　50 years　60 years　70 years

Imagine you are 22 years old and a new college graduate with a deposit of $10,000. You plan to save the $10,000 for retirement (in approximately 40 years).

3. How many times would your deposit double at 2 percent interest (rate of return)?

   • How much would your balance be at retirement?

4. How many times would your deposit double at 4 percent interest (rate of return)?

   • How much would your balance be at retirement?

5. How many times would your deposit double at 9 percent interest (rate of return)?

   • How much would your balance be at retirement?

6. What difference did the higher interest rate (rate of return) make?

Common Core State Standards

Grades 6-12 Literacy in History/Social Studies and Technical Subjects

- **Key Ideas and Details**

  RH.11-12.1: Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

  RH.11-12.2: Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas.

- **Craft and Structure**

  RH.11-12.4: Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines *faction* in *Federalist* No. 10).