Introduction

I. The Pension Problem

Public pension programs around the world face an uncertain future. Many countries of the post-industrial world are witnessing a significant demographic shift: the aging of their respective populations. While the baby boom was the most important demographic phenomena of the twentieth-century, the aging of that very generation is ushering the greatest demographic shift of the twenty-first century. Compounded by the fact that birthrates of these countries have generally fallen in recent decades, the accelerated aging of their populations has forced them to re-evaluate the sustainability of their public pension systems—which were mostly designed under the assumption of an implicit, pay-as-you-go (PAYG) social contract in which subsequent and larger generations would support the older generations.

France has not escaped this demographic dilemma and the concomitant strain on its public pension system. Despite the popularity of the French welfare state, the aging of the baby boom generation, dubbed the "papy boom" in France, is shaking the foundations on which the system was established.[1] Because of its relatively young retirement age, France is one of the first countries in the world to experience the economic and social effects of the papy boom. Furthermore, the financial crisis of 2008 amplified the necessity for reform—not in some distant future, but now.

[1] "Papy" being the French familial term for "grandfather," and slang for "old man."

In November 2010 the French government succeeded in passing legislation aimed at eliminating the public deficit that results from the pension system.[2] However, the reform did not escape criticism and opposition. Public mobilization against these reforms demonstrated that pension reform is almost never popular.[3] The unpopularity of pension reform, like the current demographic shift, is not unique to France.

The papy boom endangers more, however, than just the fiscal sustainability of public pensions—it also threatens the principle of intergenerational solidarity upon which the system was built. In 1946, as the nation rebuilt itself from the rubble of World War II, the creators of the French social security system used the concept of solidarity to liberate the French people from the grips of poverty and despair. Public pensions are at the heart of national solidarity in the sense that one demographic group actively supports another demographic group through the PAYG structure; accounts are theoretically balanced as one generation eventually receives in benefits what it contributed in taxes. Due to the nature of PAYG, the papy boom increases the cost of public pensions at the expense of future generations—without the guarantee of reimbursement at retirement for the younger generations. The uneven distribution of this cost results in a system that is unsustainable and intergenerationally inequitable, thus contradicting the principle of solidarity.

Although the French government has pursued pension reforms since the early 1990s, this thesis argues that the reforms have not managed to reconcile the demands of

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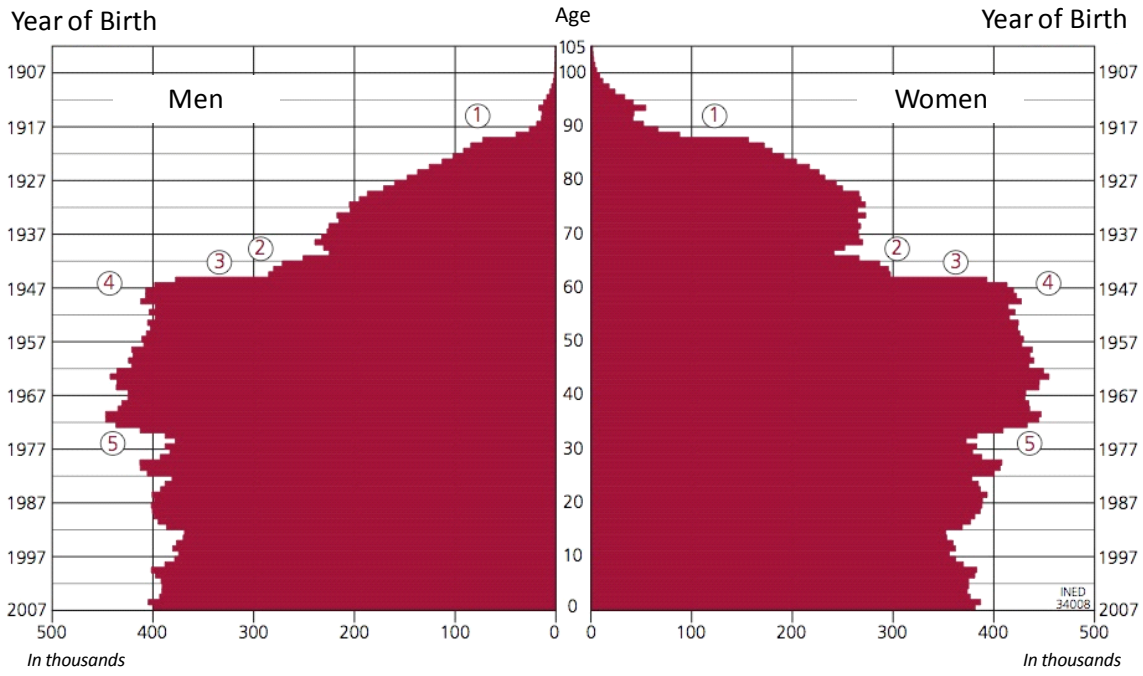
[2] Direction Generale de l'Administration et de la Fonction Publique, "La Reforme des Retraites 2010," accessed April 18, 2011, http://www.fonction-publique.gouv.fr/rubrique316.html.

[3] *Le Point,* "Reforme des Retraites—La Mobilisation Secteur par Secteur," October 19, 2010, accessed October 28, 2010, http://www.lepoint.fr/economie/reforme-des-retraites-la-mobilisation-secteur-par-secteur-19-10-2010-1251414_28.php.

intergenerational solidarity and fiscal sustainability. If anything, whatever success the French government has achieved with regard to fiscal sustainability has come at the expense of intergenerational equity. But must this necessarily be the case? Can fiscal equilibrium within the pension system be attained while simultaneously respecting intergenerational equity? The quantitative analysis of demographic and pension data suggests that it is indeed possible to reconfigure the parametric variables of the pension system so as to distribute the cost of reform fairly across generational cohorts while also eliminating current and future deficits within the pension system. Furthermore, this thesis argues that not only does a balanced budget promote intergenerational solidarity, but that intergenerational solidarity is the political key to win reform towards a balanced pension budget.

Graph 1: Population Pyramid of France, 2008



Source: Institut National des Etudes Demographiques
1) Low birth-rates during World War I; 2) Increasing fertility; 3) Low birth-rates during World War II; 4) Baby boom; 5) End of baby boom.

II. Literature

The subject of the aging of the baby boom generation and its economic repercussions is not new within economic scholarship on pension reform. The economic literature addresses the fiscal sustainability of pension programs and often proposes technocratic solutions to combat the rising costs associated with such programs. Economists have warned for decades of the strain that the papy boom will place on economies, and of the restructuring that must take place in order to avert unprecedented levels of public deficit.

Much of the criticism towards public pension programs is directed toward PAYG systems, such as the one in France. Many economists, such as P.M. Jackson and John Bongaarts, claim that PAYG systems cannot support the pressure of an aging population, because PAYG systems rely on the assumption that birthrates increase from generation to generation. PAYG systems also rest on massive intergenerational transfers of income without the consent of future generations when the contract was established. Jackson emphasizes the weakness of a system that relies on a tacit social contract, writing, "what happens if they (the younger generations) decide that they will not or cannot honour them (the social contract)?" [4] Perhaps in response to the question posed by Jackson, Bongaarts suggests that the failure to address the stress of aging populations on PAYG systems could inflict serious "macroeconomic damage, both on the domestic economy and, in the case of large industrial countries through international linkages, on the world economy."[5]

[4] P.M. Jackson, "Economics of an Aging Population," *Journal of Epidemiology and Community Health* 39 (1985): 99.
[5] John Bongaarts, "Population Aging and the Rising Cost of Public Pensions," *Population and Development Review* 30 (2004): 1.

Whereas Bongaarts proposes solutions to maintain PAYG systems by outlining four policy options to assure the sustainability of such pension programs, economists Richard Disney and Martin Feldstein claim that it is the very nature of PAYG systems that is unsustainable. Both Disney and Feldstein recommend partial-privatization as the solution to eliminate the public deficit incurred by many state-sponsored pension schemes. Moreover, Feldstein presents mathematical models to estimate the costs incurred from transitions from unfunded to funded pension schemes.[6]

Whereas economic scholarship analyzes models for and costs associated with pension reform, political scientists address the question of when and why pension reform succeeds or fails. In the words of Paul Pierson, welfare state retrenchment, in our case pension reform, generally requires elected officials to pursue unpopular policies that must withstand the scrutiny of both voters and well-entrenched networks of interest groups.[7] However, Vivien Schmidt points out that because pension reform has succeeded more often than one would expect, traditional and rationalist assumptions fail to explain why policy initiatives succeed, despite narrow self-interest of electoral majorities, thus challenging deeply-held values and reversing long-standing practices.[8]

Political literature on pension reform suggests three variables that influence the success or failure of retrenchment: Economic conditions, institutional context, and discourse. Many political scientists, such as Christoffer Green-Pedersen, Herbert

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[6] Martin Feldstein, "Structural Reform of Social Security," *Journal of Economic Perspectives* 19, no. 2 (2005): 37. Richard Disney, "Crises in Public Pension Programmes in OECD: What are the Reform Options?" *The Economic Journal* 110, no. 461 (2000): F1-F23.
[7] Paul Pierson, "The New Politics of the Welfare State." *World Politics* (1996): 144.
[8] Vivien A. Schmidt, "Does Discourse Matter in the Politics of Welfare State Adjustment?" *Journal of European Public Policy* 9, no. 6 (2002): 2.

Kitschelt, Pierson, and Schmidt, indicate economic necessity as the primary cause for pension reform and a major factor affecting the outcome of a reform proposal. In particular, Schmidt emphasizes the presence or absence of an economic crisis, as well as the level of competition in capital and product markets as indicative of the way a reform will unfold,[9] and Green-Pedersen argues that the degree of retrenchment will depend on the intensity of economic difficulties.[10]

Schmidt defines the second factor, institutional context, as the principal policy actors' ability to impose or negotiate change depending upon political interactions and institutional arrangements. In particular, Schmidt highlights the power of the executive branch as definitive of the influence institutions will have on reform.[11] Pierson continues with the theme of institutional context, stating that strong states are likely to produce strong welfare states. As policy decisions have had increasingly pervasive effects on economic and social life, their impact on political processes has expanded.[12]

Lastly, Schmidt argues that discourse is the final element in the explanation of how the public might change its perceptions of self-interest and accept new institutional practices that may challenge commonly held values involving the welfare state.[13] With regard to pension reform, discourse provides the mechanism by which politicians might

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[9] Vivien A. Schmidt, *The Futures of European Capitalism* (Oxford: Oxford University Press, 2002), 62. Herbert Kitschelt. "Partisan Competition and Welfare State Retrenchment. When Do Politicians Choose Unpopular Policies?" in *New Politics of the Welfare State,* ed. Paul Pierson (Oxford: Oxford University Press, 2001). Christoffer Green-Pedersen, "Welfare-State Retrenchment in Denmark and the Netherlands, 1982-1998: The Role of Party Competition and Party Consensus." Paper presented at the 11th SASE Conference, Madison, Wisconsin, July 8-11, 1999.
[10] Green-Pedersen, "Welfare-State Retrenchment," p. 966.
[11] Schmidt, *Futures of European Capitalism*, p. 62.
[12] Paul Pierson, *New Politics*, p. 144.
[13] Schmidt, "Does Discourse Matter," p. 2.

change preferences by altering perceptions of economic vulnerabilities and policy legacies, thereby enhancing political institutional capacity to impose or negotiate change.[14] Schmidt argues that for reform to be successful, discourse must appeal to values—politicians must not only prove the necessity of, but also the appropriateness of reform.

The literature on pension reform as a whole falls short in that there is no cohesion between the economic and political schools of thought. On the one hand, economists focus on the cost of reform, regardless of the country in which it might take place. They tend to ignore the policy preferences a government or population might have with regard to pension reform and fail to evaluate the cost of a specific reform in a specific country. On the other hand, however, political scientists do not address economic variables within the models of reform that lead to the success or failure of retrenchment. They focus on variables of the political structure rather than the actual policies of pension reform.

Economic and political literature render the subject of pension reform dull and disconnected from society, as if it were a subject reserved for the intellectual elite. Yet, the public response to pension reform begs the contrary—an uninterestingly complex subject should not be capable of inciting the level of controversy that has surrounded past periods of reform in France. Popular literature and news coverage suggest that pension reform is exciting and dynamic, and that it is potentially at the heart of the growing discontent of the young in France.

One such publication to make waves hit France in 2008, as baby boomers celebrated the fortieth anniversary of their generation's social revolution and liberation in

[14] Schmidt, *Futures of European Capitalism*, p. 62.

May of 1968. While the government praised the baby boom generation for its achievements, a young civil servant by the name of Gregoire Tirot castigated the French government for its "exploitation" of the young in his contentious publication entitled, *France: Anti-Young*.[15]

In his book he argues that the intergenerational inequalities that exist in contemporary France result from the institutions and policies developed and implemented by the baby boom generation. Tirot argues that not only have the baby boomers implemented a socioeconomic model that hinders the young from joining the work force, they have also placed the financial burden of funding their retirement pensions on the shoulders of the young. He warns that these policy legacies of the baby boom generation, coupled with population aging, have placed France at the verge of a socioeconomic crisis. He writes,

> It is no exaggeration to say that we are facing a new social issue, perhaps as dangerous and destabilizing as the class struggle of the past…Today, the French youth is the victim of the greatest social regression since the end of the Second World War…Our social security system is threatened by this trend. On a social level, the aging population creates a power relationship that is quantitatively, and therefore politically, favorable to the elderly. A majority of elderly against a minority of young. As time passes, the number of those who withdraw from our pension system will outweigh those of us who support it. One day our children will no longer accept this burden. They will rebel. They will trigger massive inflation to cancel the debt of their parents…the battle will

[15] Grégoire Tirot, *France Anti-jeune: Comment La Société Francaise Exploite Sa Jeunesse* (Paris: M. Milo, 2008).

be ruthless and, ultimately, today's winners will be tomorrow's losers.[16]

Anti-Young seems to have foreshadowed the controversy surrounding the reform in 2010. From May to November of 2010, French of all ages and socioeconomic backgrounds protested in the streets—some for reform and others against it. France seemed to be in the midst of a 1968 déjà vu when students joined the protests in September of 2010. According to news reports and government publications, the series of strikes that ensued were the largest since those of 1995 against the Juppé reforms.[17]

The public mobilization in 2010 illustrates the delicate relationship between the French pension system and the ideological notions of fairness associated with it. Although meager in relation to economic and political literature, scholarship exists concerning intergenerational equity and solidarity within public pension programs. Paul V. Dutton, for example, examines the historic role of solidarity in the French social security system. He argues that solidarism provided a secular philosophy, distinct from extreme liberalism and socialism, to justify state-sponsored social programs.[18]

Others have examined intergenerational equity specifically in terms of types of pension schemes. Regarding PAYG systems, one individual's gain is often viewed as another's loss. This perception of PAYG inevitably results in debates to determine what program is most just and equitable, both for those who contribute to the system and for those who benefit from it. Although criticism of pensions is often directed towards

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[16] Note : My translation from French. Tirot, *Anti-Jeune*, p. 2.
[17] *TF1 News*, "Manifestations: Guerre des Chiffres," September 24, 2010, accessed October 28, 2010, http://lci.tf1.fr/economie/social/2010-09/retraites-legere-erosion-dans-la-rue-6076144.html. September 24, 2010.
[18] Paul V. Dutton. *Origins of the French Welfare State: The struggle for social reform in France 1914-1947* (Cambridge: University Press 2002), 7.

unfunded systems, Bryn Davies argues that all pension systems inherently involve some amount of redistribution of wealth. Essentially, the rejection of all forms of redistribution undermines the very nature of state-sponsored pensions.[19]

Pension programs are often categorized as either PAYG or funded. Within PAYG systems, today's contributions fund the retirement pensions of current retirees. Funded systems, on the other hand, are often defined by the presence of private pension accounts, in which a worker saves money to fund his or her own retirement. Funded schemes are much less prevalent in Europe than are PAYG systems.[20]

Throughout periods of pension reform, the French government has consistently proclaimed that it will protect the structure of the PAYG system. A review of past reforms indeed shows that the government has stayed true to its word. For example, the official government website of the 2010 pension reform states that the reform pursues two major objectives: The first, to reestablish financial equilibrium within the pension system by 2018, and the second, to maintain the PAYG system for current and future pensioners.[21] Leaders of the reforms in 1993 and in 2003 also upheld the PAYG system, stating that it symbolizes the manifestation of solidarity in French society.[22]

In maintaining the PAYG pension system, reforms of the past have only manipulated endogenous variables of the system, such as the benefits, retirement age and

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[19] Bryn Davies. "Equity Within and Between Generations: Pension Systems and Equity," in *Pensions in the European Union: Adapting to Economic and Social Change*, ed. Gerard Hughes and Jim Stewart, (Boston: Kluwer Academic Publishers, 2000), 109.
[20] Disney, "Crises," F2.
[21] Retraites 2010: Une Reforme Juste pour Chacun Entre Nous Official Government Website, "La Reforme en Sept Points," accessed April 18, 2011, http://www.retraites2010.fr/le-projet-de-loi.
[22] La Retraite en Clair, "Le System de Retraite: Vingt-Ans des Reformes," accessed April 18, 2011, http://la-retraite-en-clair.fr/cid3190721/lesystemeretraiteansreformes.html.

contribution rates. Although many economists criticize PAYG systems, this thesis maintains the PAYG structure of the public pension system in France for two reasons. First, the PAYG system in France is a mechanism to promote solidarity. Thus, my research investigates the effects of manipulating certain parametric variables within the framework of PAYG in order to determine whether the system can be reformed to reconcile fiscal equilibrium with intergenerational equity. Eliminating the PAYG structure from my research would fail to address issues of intergenerational equity that result from imbalances within the system as it is today. Second, current proposals for future reforms of the pension system in France involve parametric reforms to variables endogenous to the PAYG system. Maintaining the PAYG structure in this thesis allows me to address the shortcomings of these proposals, specifically in the sense that they do not address intergenerational equity as part of their models.

III. Methodology

The point of departure for my research involves a report published in April 2010 by the Conseil d'Orientation des Retraites (COR).[23] The French government established COR in 2000 in order to monitor the French retirement system and to offer recommendations for public policy concerning retirement. In April 2010, COR published a report urging the government to take immediate action to reform its pension system. The publication of this report opened the door to a heated national debate that ended in November 2010 when President Sarkozy signed the reform into law.[24]

[23] My translation: Pensions Advisory Council.
[24] Legifrance, "Loi No. 2010-1330 du 9 Novembre 2010 Portant Reforme des Retraites (1)," accessed April 18, 2011, http://www.legifrance.gouv.fr/affichTexte.do.

My research is designed to examine the claims of the COR April 2010 report. In particular, I seek to address what I believe to be a major short-coming of the reforms proposed by COR: the absence of any analysis with regard to the impact of these reforms on different generations of French citizens. My research is designed to examine how the deficit within the public pension system in France might be eliminated by reforms in the short-, medium-, and long-term, and to determine the effects of these conditions on four cohorts of generations.

The reforms proposed in the COR report involve pension levels, contribution rates, and minimum retirement age. According to the report, in order to reach equilibrium within the system, major reforms will be required in 2020, 2030, and 2050. To measure the impact of reform on intergenerational equity, four generational cohorts have been grouped based on whether or not the cohort will be affected, in terms of pension benefits, contribution rates, and retirement age, by the reforms in 2020, 2030, and 2050. These cohorts are: Cohort I, Cohort II, Cohort III, and Cohort IV. The weight of each variable of reform is determined by using regression analysis. The collective effect of each reform has been measured in terms of average pension per year, average contribution rate during active life, and life expectancy from the year of retirement. The deficit due to public pensions is defined as:

$$Deficit_t = Total\ Contribution\ Revenue_t - Total\ Pension\ Expenditure_t, \quad (1)$$

where subscript *t* refers to any given year.

The deficit is a function of the average pension benefit, length of retirement, and the contribution rate for a given year, therefore we can write:

$$Deficit_t = f(average\ pension\ benefit_t, length\ of\ retirement_t, contribution\ rate_t) \quad (2)$$

Intergenerational equity is evaluated in terms of the collective contributions relative to the collective benefits of a given generation. The most equitable pension system is one in which lifetime contributions are proportionate to total pension benefit received over retirement while also maintaining a balanced budget, or very low deficit, within the system. Equity is also measured in comparison to the relation between lifetime contributions and total pension benefit in a system left unreformed, as well as to one in which there is zero deficit.

IV. My Argument/The Argument of this Thesis

Literature on pension reform and the way in which reform has been carried out in the past make it clear that there are several factors that will influence the extent of and the success of reform. In France, the social contract essential to the pension system juxtaposes increasingly conflicting economic and social expectations, especially as the baby boomers reach the age of retirement and the economy slowly rises out of a devastating recession. This juxtaposition polarizes two fairness issues: On the one hand, there is the entitlement of the baby-boomers who have contributed to the unfunded, PAYG system to have their contributions redistributed to them when they reach retirement. On the other hand, because of demographic developments not foreseen when the system was designed and instituted, the younger generations will bear a much greater PAYG burden because of the different sizes of the generations, especially if the deficit is to be eliminated.

This thesis argues that a balanced pension system is a more equitable system. To prove this, my thesis presents an economic model that measures the impact of variables of reform not only on the fiscal deficit of the pension system but also on cohorts of generations. The model shows that solidarity can be quantified, in terms of the relative cost of pensions and their benefit to each cohort, and thus pension reform—as a goal in and of itself—becomes much more attainable. The pension problem is not limited to the fiscal deficit in and of itself. The problem is that the older generations are passing the bill of an enormous debt to the younger generations, some perhaps not even born yet. The forthcoming papy boom threatens public pension systems as we know them today. My model demonstrates that the rising cost of pensions from the papy boom can be avoided simply by manipulating variables such as benefit levels, contribution rates, and retirement age.

This thesis also argues that, when faced with nation-wide reform, the French will oppose changes in retirement age more than they will changes to average yearly pension, and that they will object to both of these variables more than they will to changes in contribution rates. This is illustrated by the public mobilization against the 2010 pension reform. This thesis will prove that no matter the economic benefit to the pension system from increasing the retirement age, the French will oppose this measure due to perceptions of pension benefit over the short-term versus the long-term.

The leading edge of the baby boom began to reach the age of retirement in France in 2006. In 2007, public debt due to public pensions equaled 10.2 billion euros. This number is expected to have increased to 34 billion euros by the end of 2010, with retirement pensions representing about 11.3 per cent of public debt (compared to 1.9 per

cent in 2005 and 4.6 per cent in 2007.)[25] Moreover, it is projected that within the next 40 years, over 35 per cent of the French population will be above the age of 60—a threefold increase from the current representation.[26] The aging of the population poses a curious threat to France's economic stability and also to the fairness issues of entitlement and the intergenerational social contract. It is imperative that France takes the appropriate measures to alleviate its public deficit and to reach intergenerational-dependency equilibrium. What measures France should pursue will be evaluated in the following chapters.

V. The Organization of the Thesis

The thesis is divided into five chapters and a conclusion. Chapter one establishes a foundation from which to tackle the more complex issues of pension reform that are examined in later chapters. The chapter begins with a brief history of the public pension system in France, including its underlying ideology and the most recent reforms. The chapter also provides background theory concerning the economics of pension reform, and it ends with an evaluation of the issue of intergenerational equity.

Chapter two examines the fiscal challenges of the French pension system as revealed by the COR April 2010 report. The chapter compares projections of the deficit due to pensions from before and after the financial recession of 2008 and shows how the crisis adversely affected the pension system. Within this chapter, the thesis also

[25] Commission des Comptes de la Securite Sociale, "June 2010 Report," accessed April 24, 2011, http://www.securite-sociale.fr/comprendre/dossiers/comptes/2010/ccss201006_fic-12-1.pdf.
[26] Institut National de la Statistique et des Etudes Economiques, "Demographic Projections for France and French Regions," accessed April 16, 2011, http://www.insee.fr/en/themes/.

elaborates on the reforms proposed by COR to eliminate the deficit within the pension system in the short-, medium-, and long-term.

Chapter three presents the model I developed to measure the impact of pension reform on the deficit. The chapter includes the data description, the summary of data, and the empirical results from my research. This chapter also evaluates the reforms proposed by COR in terms of their success at eliminating the deficit.

Chapter four examines the economic cost to each generational cohort. The chapter presents the various ways to manipulate the variables so as to balance the cost of reform more effectively and evenly across the four generational cohorts. Furthermore, this chapter compares the results of this study to the measures proposed by the COR report.

Lastly, chapter five examines the politics of pension reform. In particular, this chapter seeks to establish what conditions allow for successful reform by examining past reforms in France. The chapter also explains why France has been successful in passing pension reform relative to other European nations.

Chapter 1:
Public Pensions and Intergenerational Solidarity in France

I. The Structure of the French Public Pension System

The public pension system in France is organized on an occupational basis and is comprised of an array of compulsory basic schemes and optional complementary schemes designed to promote solidarity through pay-as-you-go (PAYG) funding. Within a PAYG system, workers' contributions serve immediately to pay the pensions of the current retirees. The success of such a system relies on the assumption that successive generations are larger than the ones preceding, creating a sort of population-pyramid. The recent phenomenon of population aging has posed an unprecedented risk to the financing of state sponsored pensions within a PAYG system.

Modern public pensions in France were developed in 1946 under the umbrella of the social security legislation that followed the end of the Second World War. This legislation created a national old-age insurance scheme that pursued three objectives: to unify the existing old-age pension schemes (often very regionalized and industry-specific prior to 1946), to provide universal coverage, and to standardize participation at the state, employer, and individual level. In short, policymakers believed that achieving national solidarity through these objectives would help to rebuild the war-torn country. [27] While these guiding principles, inspired by Sir William Beveridge's famous report on social security, found relative success in the United Kingdom and the Scandinavian countries,

[27] Portail de la Securite Sociale, "Historique du System Francais de Securite Sociale," accessed November 26, 2010, http://www.securite-sociale.fr/comprendre/histo/historique/gdes_dates.htm.

the French system failed to achieve these three goals due to already well-entrenched social programs that dated from the nineteenth century.[28]

As with many continental countries of Europe, French social programs were inspired by the social security legislation of Otto von Bismarck in Germany in the 1880s. In the "Three Worlds of Welfare Capitalism," as defined by Gosta Esping-Andersen, the Bismarckian social security programs evolved into what is today know as the capitalist-corporatist model of welfare capitalism. [29] Herein lies an important distinction to be made: Although Esping-Andersen has typified three models of welfare capitalism, it should be noted that the capitalist-corporatist model implies a program of social insurance, whereas the other two models, liberal and social-democratic, stem from the Beveridge Report and are indeed manifestations of social welfare.

Whereas the Beveridge report called for a system of social security for all citizens in order to maintain a minimum standard of living throughout society, the Bismarckian model of social security granted a minimum standard of living only to the employed and their families.[30] Today, the capitalist-corporatist model, descended from the Bismarckian model, is designed to assure a standard of living that is close to that which is provided by participation in the labor market but when one is not able to participate due to various factors, such as injury or old age.[31] In France, the distinction between welfare-based pensions and insurance-based pensions is exemplified by the Caisse Nationale

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[28] Dutton, *Origins*, p. 2.
[29] Gosta Esping-Andersen, *The Three Worlds of Welfare Capitalism*, (Princeton: University Press, 1990), 48.
[30] Leo Wolman, "The Beveridge Report," *Political Science Quarterly* 58, no. 1 (1943): 1-10.
[31] Patrice Pourcel, *La Protection Sociale*, (Paris: Breal, 2006), 14.

d'Assurance Vieillesse (CNAV),[32] which provides a pension to those who contributed to the system throughout their careers, and the Minimum Vieillesse Fund (MVF),[33] which provides a modest income to those who did not meet the requirements to receive a pension from CNAV. It is in distinguishing insurance-based programs from welfare-based programs that the true complexity of the French pension system might be appreciated and understood.

Two features of the current French pension system should be noted. First, the precursors to the national pension plan in 1946 were constituted by special regimes established for specific professional categories, which were funded by the employee and the employer, or by mutual insurance agencies. Because early pension schemes were organized on a socio-occupational basis, several schemes continue to exist concurrently, with membership depending on one's occupational activity. Another important feature of the French pension system is that it is based upon a PAYG system; contributions made by today's workforce serve immediately to pay the pensions of current retirees. The PAYG system helps to reinforce the post-World War II aspiration of solidarity in French society.

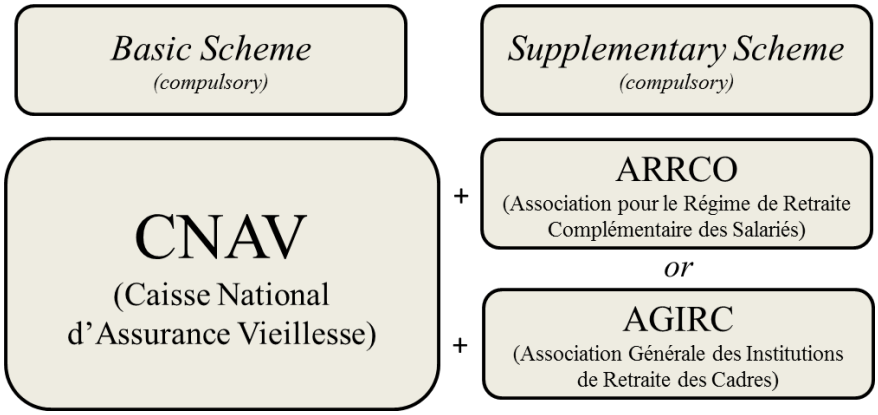
Although the French National Assembly promulgates solidarity within the pension system, pensions continue to maintain their corporatist character in that they are drawn from various profession-specific funds and are guaranteed by the mutual contributions of employees and employers. Today, approximately two-thirds of pensioners fall within the coverage of the Régime Générale.[34] This scheme is two-tier, with a compulsory basic scheme and supplementary scheme. Within the Régime

[32] English translation: National Old-Age Insurance Fund.
[33] English translation: Old-Age Solidarity Fund.
[34] English translation: General Regime.

Générale, CNAV represents the largest basic scheme. In 1972 the government created a supplementary scheme, which also operates on a PAYG basis and is compulsory,[35] in order to raise the benefits of pensioners within the basic scheme. The Association Générale des Institutions de Retraite des Cadres (AGIRC)[36] and the Association pour le Régime de Retraite Complémentaire des Salariés (ARRCO)[37] fund the supplementary scheme.

Apart from the Régime Générale, certain special schemes provide coverage to central and local government employees as well as public-sector employees. For the self-employed, the Act of January 1, 1948 established three independent old-age insurance schemes: the non-professional industrialist scheme (for carpenters and plumbers), the shopkeepers and traders scheme, and the professional scheme.[38] The retirement pensions provided by special schemes often combine the basic and compulsory supplementary tiers into a single scheme.

Figure 1.1 Two-Tier Scheme in the Pension System



[35] Compulsory in the sense that it is automatically deducted from one's paycheck.
[36] English translation: General Association of Pensions Institutions for Management Staff.
[37] English translation: Association of Supplementary Pension Schemes.
[38] Pourcel, *La Protection Sociale*, p. 85.

There are two ways to claim a pension benefit. One option is for a person to earn a pension benefit based on the number of years he or she contributed to the system. The majority of basic schemes and special schemes, such as CNAV, operate in this manner. Since the 1990s, a person must contribute for a minimum of forty years in order to receive pension rights.

The other path to attain a pension calculates an individual's pension based the number of points obtained. Most supplementary schemes operate using this method. In the point system, contributions corresponding to a salary fraction are paid in annually and are transformed into units of account, which are credited to an employee's individual account. The amount of pension at the end of an employee's career depends on the number of points accumulated in his or her account and the value of the point at that time.

II. Pension System Reforms in the 1990s and 2000s

Rather than restructuring the unfunded nature of public pensions, recent reforms have involved only the manipulation of certain endogenous variables, such as the retirement age, contributions, and benefits.[39] For several decades, the pensions in France continued to grow and to rely more heavily on the PAYG system. In 1991, the publication of a White Paper that brought to light the cost of funding the baby boomers in retirement forced the government to reexamine the organization of the public pension program. Many consider the early 1990s the beginning of pension retrenchment in France.[40]

[39] Jean-Baptiste Chastand, "Les Retraites: Ce que Prevoit le Projet de Loi," *Le Monde*, September 7, 2010, http://www.lemonde.fr.
[40] Marc Horwitz, *L'avenir des Retraites*, (Paris: Armand Colin, 2010), 24.

A. The Balladur Reform

Prime Minister Edouard Balladur led the first wave of pension reform, which passed in 1993 and became known as the Balladur reform. One of the first measures of the reform involved evaluating pensions with respect to the price index, meaning that benefits would henceforth be linked to inflation. The second measure of the reform increased the years of contribution from 37.5 to 40 years, in three-month intervals. Workers born after 1933 would be required to add three months of contribution for each year before being eligible to retire with full-pensions. For example, those born in 1933 would be able to retire after contributing for 37.5 years. People born in 1943 would need to contribute for 40 years before reaching eligibility. The last important measure of the reform based pension benefits on the twenty-five best years of one's salary, whereas before the reform, pensions were based on the best ten years of one's salary. [41]

The Balladur reform did help to absorb some of the mounting deficit caused by financing public pensions. However, the reform was heavily criticized for its shortsightedness and its narrowness. Not only did the reform fail to address the issue of population aging, it only alleviated the deficit for a few years. Furthermore, it concerned only the pension programs of private sector employees and civil servants.

B. The Fillon Reform

In 1994 it became clear that the Balladur reform of 1993 failed to resolve the issues associated with financing pensions. A new report published by CNAV brought to light the effect of population aging on the pension system. Because of the PAYG system, change in the old-age support ratio directly affects the viability of the program.

[41] Ibid., pp. 22-27.

Projections by the National Institute of Statistics and Economic Studies (INSEE) in 1995 showed that if the retirement age were maintained at 60 years, there would be three pensioners for every five workers by 2040. As a consequence, maintaining the PAYG system would result in having to increase the social contributions by the younger generations.[42]

Under Prime Minister Alain Juppé the government pursued new reforms to address the looming fiscal crisis. However, the intensity and the duration of the strikes against the Juppé reforms paralyzed the French economy, forcing President Chirac to declare a national emergency and to abandon the reform. In 1997, parliamentary elections forced Minister Juppé out of office and placed the Socialist Party's Lionel Jospin as prime minister, thus resulting in a left- and right-wing cohabitation and handicapping the pursuit of further reforms.[43]

In 2002, President Jacques Chirac returned to l'Elysée for a second term, although instead of representing the Rally for the Republic party (RPR), he established a new conservative party, Union for a Popular Movement (UMP).[44] Under the direction of Francois Fillon, the Minister for Social Affairs, the government immediately began to respond to the reports published in the late 1990s concerning the effects of population aging. In 2003, the government launched a campaign to once again address the growing deficit in public pensions.

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[42] Pourcel, *La Protection Sociale*, p. 55.
[43] Horwitz, *L'avenir*, p. 26.
[44] Site Gouvernmentale de l'Elysee, "Histoire des Presidents de la Republique," accessed February 11, 2011, http://www.elysee.fr/president/la-presidence/le-president-de-la-republique/histoire-des-presidents-de-la-republique/jacques-chirac-1932.5308.html.

The first measure of the Fillon reform echoed that of the Balladur reform in that it increased years of contribution from forty to forty-one years by 2012. Additionally, the reform explicitly stated that, in the future, years of contribution would change according to projections of life expectancy. The second important measure in the Fillon reform relaxed the retirement age for labor-intensive industries. Lastly, the government established a tax-deductible system of individualized, private retirement accounts, an incentive for workers to set aside their own money for retirement.[45]

C. Reform in 2010

No further measures were taken to reform the pension system until 2008, when the government conformed the regulations of the private and public sector pension systems. This measure marked the beginning of a new episode of pension reform that involved three measures aimed at eliminating the public deficit due to retirement pensions by the year 2018. After two years of national debate, President Nicolas Sarkozy signed the reforms into law on November 10, 2010.

The major objectives of the reform were tri-fold. The first, and most controversial, measure of the reform raises the minimum retirement age from 60 to 62 years in four-month increments from the year 2010 until 2018. The second measure conforms the pension systems of private and public sector employees. Lastly, the third measure reform raises the tax on non-earned income.[46]

[45] Pourcel, *La Protection Sociale*, p. 23.
[46] Retraites 2010: Une Reforme Juste pour Chacun Entre Nous Official Government Website, "La Reforme en Sept Points," accessed April 18, 2011, http://www.retraites2010.fr/le-projet-de-loi.

III. Solidarity and Equity through Pension Programs

At the beginning of the twentieth-century, solidarity provided a secular philosophy distinct from socialism, liberalism, and Catholicism to serve as a platform for state-directed social reform. Advocates promoted the philosophy as a mechanism by which to achieve the Republic's promise of *fraternité* in French society.[47] Today, solidarity continues to serve as an ideological platform from which both sides of the pension debate pursue their policies and reforms.

Solidarity exists at various levels in the public pension system in France. First, although contributions are required on behalf of a worker in order to be part of the pool of pensioners at retirement, each scheme guarantees a minimum pension regardless of the total amount of contributions throughout an individual's career. This minimum pension reinforces solidarity by serving as an insurance against poverty when one is unable to work due to old age.[48]

Another way in which solidarity is expressed through pensions is by the redistribution of funds that occurs between declining sectors, such as mining, and sectors with larger numbers of current contributors, in order to account for disparities between growth and decline in various industries. In 1993 steps were taken to further cultivate solidarity with the establishment of the Solidarity Fund for the Elderly, which was created to ensure the minimum level of income required to live to anyone of 65 years or older whose income or pension is inadequate. This fund is separate from pensions

[47] Dutton, *Origins*, p. 7.
[48] Pourcel, *La Protection Sociale*, p. 29.

schemes, and is perhaps the best example of solidarity at work, in that it is financed out of general taxation rather than contributions.[49]

Maintaining the PAYG structure of the pension system is a commitment that the French government has explicitly proclaimed throughout its dialogue with the French public in periods of reform.[50] Despite the government's efforts to foster a positive discourse concerning reform, each period of reform since the 1990s has excited the mobilization of workers' and interests groups through strikes and protests. The strikes and protests surrounding pension reform in France bear witness to the issues of equity and solidarity that are called into question by the redistribution of income that occurs through state sponsored social programs.

A. The Redistribution of Income in Public Pension Programs

Public pensions, as a state sponsored social program, redistribute income from one group of citizens to another. Theoretically, the advantage of a PAYG system is that this redistribution is temporary; the income redistributed from a younger generation to an older generation is reimbursed to the younger generation once it reaches retirement, so that each generation receives exactly what it paid. Faced with aging populations, however, many assume PAYG pensions to be a zero-sum game: One individual's gain through income redistribution must be another individual's loss.[51] Thus, it is inevitable that a significant portion of the pension debate involves determining what program is

[49] Ibid., p. 30.
[50] Retraites 2010: Une Reforme Juste pour Chacun Entre Nous Official Government Website, "Pourquoi la Reforme en 2010?" accessed April 18, 2011, http://www.retraites-2010.fr/racine/pourquoi-reformer/article/pourquoi-la-reforme-en-2010.
[51] Davies, "Equity Within and Between Generations," p. 109.

most just and equitable, both for those who contribute to the system and for those who benefit from it.

The objectives of pension programs tend to shape the extent to which income is redistributed in a society. Because of the different types of pension programs, such as defined-benefit and defined-contribution, there are several different categories of redistribution, resulting in different objectives concerning equity. On the one hand, equity might be an active player in a pension system that intentionally redistributes a larger proportion of income to pensioners who had lower lifetime incomes. On the other hand, equity through redistribution might play a more passive role, such as in systems that do not actively promote equity but nevertheless experience redistribution because of differences in mortality. A pensioner who lives longer will inevitably receive a greater amount of pension than a pensioner with a shorter life. This type of passive redistribution is present in France, where the pension program does not seek to redraw socio-economic lines.[52]

An important feature distinguishing a pension system from a simple personal savings plan is that pension programs are designed to mature over a span of time. The result of such a design is that pensioners do not receive a lump sum of income at the moment of retirement, but instead the pension is distributed over a period of time, which could be ten years, or thirty, depending on the individual's life span. This particular aspect of pensions implies that commitments undertaken by pension systems can involve successive generations, inevitably raising the question of equity between generations.

[52] Pourcel, *La Protection Sociale*, p. 80.

Intergenerational distribution is defined as income transfers between different age cohorts of persons. Although the role of equity through redistribution in a pension system is a controversial aspect within the pension debate, it should not be depicted as a flaw in the system. After all, like the time dimension of pensions, redistribution distinguishes pension programs from personal savings plans. The rejection of all forms of redistribution would undermine the very nature of state-sponsored pensions. Many disagree as to what extent redistribution should take place within a pension program, and ultimately such issues are only resolved by political means.

B. Four Reasons for Redistribution

The reasons for income redistribution can be categorized into four groups. Often, pension systems combine several types of redistribution. The first reason for redistribution is social, in order to provide adequate pensions for people who cannot afford to pay for their own retirement. Second, redistribution can serve as a form of insurance to protect members and their dependants against misfortunes that might otherwise lead to their impoverishment, such as longevity and death. Third, redistribution can ease the effects of transitioning to a new system that might have recently been implemented. Lastly, a fourth reason for redistribution is to achieve other desirable objectives, such as low cost, comprehensibility, and approval from society.[53]

The redistribution of income in France exhibits a mélange of the social and insurance categories listed above. Such overlapping of the categories of redistribution is a major issue with pension reform, for each category of redistribution creates its own interest groups, thus complicating a new policy's acceptability. These different purposes

[53] Davies, "Equity Within and Between Generations," pp. 114-119.

of redistribution serve conflicting interests and result in passionate debates of equity in periods of pension reform.

One debate concerning the equity of income redistribution in pension systems involves funded schemes versus PAYG schemes. Funded pension schemes are those that have available assets to cover all liabilities, including the obligation of future payment to retirees.[54] The arguments in this debate are often one-sided, seeking only to illustrate the shortcomings of PAYG systems. One assumption of this argument is that funded systems involve no income redistribution. Funded schemes are assumed to be equitable because each member only receives what he or she has contributed, plus any fluctuations in the interest rate, which affect all other contributors.[55]

A flaw in approaching funded schemes with the assumption that the only equitable system is one that gives members a rate of return according to what they have contributed is that it shuts the door on all other possible options for providing pensions. If it is only equitable for a member to receive benefits based on what he or she has contributed, then there is nothing separating this form of a pension from an individual savings account, which then undermines the basic principles of pensions as a social insurance and whatever broader social goals it might have. Such assumptions ignore any underlying desire there may be for solidarity and equitable distribution of economic resources.

It is essential to continually assess the place for intergenerational solidarity within pension systems. Views on pension reform tend to neglect the role of intergenerational

[54] Giuliano Bonoli, "Two Worlds of Pension Reform in Western Europe," *Comparative Politics* 35, no. 1 (2003): 401.
[55] Davies, "Equity Within and Between Generations," p. 113.

solidarity as a founding principle of modern pension programs and instead focus on the economic costs and benefits. The current debates on pension reform are a testament to the fact that there is no simple or obvious relationship between the economic and social effects of a given pension program, and thus no clear answer as to what system is the most equitable.

Chapter 2:
Reaching Fiscal Stability within the Pension System

In response to the growing uncertainties throughout the 1990s concerning the financing of public pensions, the French government ushered in the new millennium with the establishment of various organizations to audit the sustainability of the pay-as-you-go (PAYG) system in the face of changing demographics. One such organization, the Conseil d'Orientation des Retraites (COR), was established in 2000 in order to monitor the French retirement system and to offer recommendations for public policy concerning retirement. As part of the Fillon reform in 2003, Article 6 extended the responsibilities of COR to include five-year reports describing short-term and long-term projections of the cost of pension schemes in light of economic, social, and demographic evolutions.

Although COR published a report in 2007, the financial crisis of 2008 exposed a pension system that was much weaker than portended in the earlier report. COR deemed it necessary to publish an updated report in 2010, rather than wait until the scheduled date in 2012. The updated report, published in April of 2010, lays the foundation for the analysis of this thesis. The projections of the 2010 report will be used to assess which scenario of reform is most equitable and financially promising.

Table 2.1 outlines current projections of the pension system if it is left unchanged. Based on the COR projections, an unreformed pension system in France will result in a deficit (within the pension system) that is sixteen times larger than it was in 2006. Although expenditure on pensions as a percent of the gross domestic product (GDP) only increases by a few percentage points, the expenditure on pensions in euros triples between now and 2050.

Table 2.1 Projections of COR Report 2010*

	2006	2015	2020	2030	2040	2050
Expenditure on pensions (% GDP)	13.1	13.7	14.1	14.7	14.9	14.7
Mass contributions (% GDP)	12.9	13.0	13.0	13.0	13.0	13.0
Required annual funding (% GDP)	0.2	0.7	1.0	1.6	1.8	1.7
Expenditure on pensions (Bn €)	235.2	301.1	337.1	420.1	511.8	606.6
Mass contributions (Bn €)	231.0	286.0	312.2	373.0	448.4	537.8
Required annual funding (Bn €)	-4.2	-15.1	-24.8	-47.1	-63.4	-68.8

Source: Adapted From COR April 2010 report. The minus signs indicate a deficit. *Note: using 2006 euro.

As chapter one illustrates, the French pension system is an intricate web of independent funds and associations, thus confounding efforts to study a single comprehensive system. However, the projections in the COR reports do not distinguish between different pension schemes. The report only makes projections for CNAV, the pension scheme that represents the largest portion of the population. Thus, this thesis will only evaluate CNAV in order to build a model to reconcile fiscal sustainability and intergenerational solidarity.

The remainder of this chapter discusses the fiscal outlook for CNAV in the short- and long-term according to the COR report. The long-term consequences of the financial crisis on the French retirement system are complex. In particular, they depend on the impact of the crisis on economic growth and long-term unemployment, which remains uncertain. Given these ambiguities, COR established several assumptions for its projections, which I also maintain in my own analysis. The assumptions are outlined in Table 2.2.

Table 2.2 Assumptions of the COR Projections of the April 2010 Report

Fertility	1.9 children per woman
Mortality	Increase in life expectancy from birth (2000-2050) • 75.3 to 83.8 years for men • 82.8 to 89.0 years for women
Immigration	Net migration of +100,000 persons per year
Unemployment	4.5%
Productivity	Annual increase of 1.8%
Duration of contributions	Increase from 40 to 41 years in 2012, and to 41.5 years in 2020, maintaining 41.5 years until 2050
Evaluation of pensions	Linked to inflation

Source: Cor April 2010 report

The report makes projections of the pension system according to three different economic scenarios, A, B, and C, involving unemployment and productivity. Each scenario used in the study was constructed by the Department of the Treasury, whose goal was to design three scenarios taking into account the uncertainties surrounding the effects of the recession and, without covering the whole field of possibilities, to contrast potential consequences of the crisis in the short- and long-term.[56] In the short-term, the scenarios are consistent with economic forecasts made by the government within the framework of the Economic and Monetary Union in 2009.

Scenario A involves a full return to pre-recession levels of output. Scenario B is somewhat less optimistic, assuming that the rate of unemployment in the long-term is the same as before the crisis but that the growth rate is lower. The least optimistic of the three, scenario C, assumes that long-term productivity is lower and that the unemployment rate is higher relative to pre-crisis levels.

[56] Conseil d'Orientation des Retraites, "Retraites: Perspectives Realisees a Moyen et Long Terme en Vue du Rendez-Vous de 2010—Huitieme Rapport," 11.

Table 2.3 The Three COR Scenarios A, B, and C

		Long-term Productivity	
		1.8%	**1.5%**
Long-term Unemployment	**4.5%**	Scenario A	Scenario B
	7.0%		Scenario C

Source: COR April 2010 report

These three COR scenarios are designed to address the effects of the financial recession on retirement. Using projections of economic and demographic growth, COR determined the level of financing needed to reach fiscal equilibrium in the pension system for each scenario, A, B, and C. The April 2010 COR report proposes three reforms to be implemented successively in order to reach financial equilibrium.

The interest of this thesis lies in examining the effect of the proposed changes to the endogenous variables of the pension system on the fiscal sustainability of French pensions and its implications for intergenerational solidarity. My research concentrates on scenario B because it represents neither an overly optimistic projection of future economic conditions, such as scenario A, nor a more pessimistic projection, such as scenario C. On the one hand, scenario B does not leave room for the government to ignore the pension problem, which could possibly result from over-confidence in future growth if scenario A is accurate. On the other hand, scenario B does not require such austere measures of reform, as would the conditions posed by scenario C.

COR presents several measures to reach fiscal equilibrium within the pension system on the basis of scenario B. Recall from table 2.3, Scenario B assumes the unemployment level to be at 4.5 per cent and productivity to increase at a yearly rate of 1.5 per cent. According to COR, it is necessary that by 2020 the average pension

decrease from the base year 2008 levels by 3.5 per cent. For the same reason, contributions to the pension system must increase by 4.2 points, and the retirement age must be raised by one year. Financial equilibrium in the year 2030 requires that the average pension decrease by 8.7 per cent from base year 2008, contributions increase by 5.6 points, and the retirement age rise by one-and-a-half years. In order to maintain equilibrium in 2050, average pensions will have to decrease by 15.6 per cent from base year 2008, contributions will have to increase by 6.0 points, and the retirement age will have to rise by two years. The reforms 2020, 2030, and 2050 are not alternatives to each other. Instead, COR proposes that these measures be implemented successively. Table 2.4 recapitulates these conditions for equilibrium.

Table 2.4 COR Conditions for Equilibrium in the Pension System, Scenario B

CHANGE FROM BASE YEAR 2008	**Average Pension Benefit**	**Contribution Rate**	**Retirement Age**
Reform 2020	-3.5 %	+ 4.2 points	+ 1 year
Reform 2030	-8.7 %	+ 5.6 points	+ 1.5 years
Reform 2050	-15.6 %	+ 6.0 points	+ 2 years

Source: COR April 2010 report

Although the COR report outlines in great detail the measures that the government should pursue in order to combat the pension deficit, it fails to give any indication as to the impact these measures will have on different generational cohorts. This omission seems to run contrary to the nature of the French pension system, which is founded on the notion of intergenerational solidarity—a phrase that can be found in the original texts establishing the system and one that has surfaced again and again in the public dialogue surrounding pension reform of the past, including that of 2010. In fact, the concept of intergenerational solidarity is so intrinsic to the pension system that both sides of the pension debate claim it as the basis for or against reform.

The COR report fails to provide alternative reforms to those it presents and to address how much the proposed reforms will cost in terms of intergenerational equity and solidarity. Therefore, chapter three will examine in more detail the effect of each COR reform on the deficit. Chapter four will examine the impact of the COR reforms on generational cohorts and will provide some measure as to whether or not intergenerational solidarity can exist with a balanced pension budget.

Chapter 3:
Predicting the Economic Impact of Pension Reform

Although the Conseil d'Orientation des Retraites (COR) report of April 2010 attributes the necessity of reform to the dawn of the papy boom and elaborates in much detail the measures that should be pursued in order to sustain the public pension program, it fails to shed light on the cost of such reforms for subsequent generations.[57] To address this shortcoming of the COR report, I have developed an economic model to eliminate the deficit within the pension system without sacrificing intergenerational equity. The purpose of this chapter is to illustrate the effect of each variable of reform on the deficit.

This chapter will show that regression analysis can determine which variables of reform are the most effective at reducing the deficit within the public pension system. In doing so, this chapter will lay the foundation for chapter four, which will explore whether or not the reforms proposed by COR are intergenerationally equitable and whether or not alternative, perhaps more equitable, reforms can be formulated using the regression equation proposed in this chapter.

I. Methodology

A. The Theoretical Model

The model I developed for this study can be used to project the impact of future pension reforms on the deficit within the Caisse National d'Assurance Vieillesse (CNAV) in France. Regression analysis provides a convenient tool with which to

[57] Apart from projecting conditions needed for equilibrium, the COR report is significant in that it distinguishes population aging as the reason reform must occur, and that the economic crisis only accelerated the need for reform. As chapter five discusses, the traditional view on pension reform is that economic crises are the cause for reform.

determine the effect of each variable of reform—average pension benefit, contribution level, and the retirement age—on the deficit of the public pension system. The deficit within the public pension system is calculated as:

$$Deficit_t = Total\ Contribution\ Revenue_t - Total\ Pension\ Expenditure_t. \quad (3\text{-}1)$$

The deficit, as defined in this thesis, is a function of the average pension benefit, length of retirement,[58] and the contribution rate for a given year. Therefore we can write:

$$Deficit_t = f(average\ pension\ benefit_t, length\ of\ retirement_t, contribution\ rate_t) \quad (3\text{-}2)$$

While this thesis does not presume to have provided an exhaustive model of the variables involved with pension reform and intergenerational equity, it is hoped that the simplified model derived for this study might serve as a launching pad for future quantitative research of pension reform in terms of intergenerational equity. The model includes two independent variables that account for the three variables of reform. I attained the coefficients of each variable using a linear regression,

$$Y_t = \beta_0 + \delta x_{Total,t} + \varphi x_{Con,t}, \quad (3\text{-}3)$$

where

Y = the deficit within the pension system in year *t*,

β = the deficit if all independent variables are held at zero,

Total = the average total pension benefit received over the length of retirement for a pensioner retiring in year *t*, and

Con = the obligatory contribution rate for year *t*.

Because the deficit is a function of average pension benefit, the length of retirement, and the contribution rate, I developed my model by running linear regressions

[58] Length of retirement is calculated as life expectancy at year of retirement.

of data ranging from 1974 to 2009, making thirty-six observations. I gathered data of the average CNAV pension benefit, average life expectancy at age 60, and the contribution rate for each of these years. In the model (3-3), the *Total Pension Benefit* accounts for both the average pension and length of retirement. The *Total Pension Benefit* is calculated as:

$$Total\ Benefit_i = \sum_{i=r}^{d} f(p)_t \quad , \tag{3-4}$$

where

i = a given generational cohort,

r = age of retirement for cohort$_i$,

d = age at exit from pension system, and

p = the average pension benefit in year t.

Although my regression model involves only two independent variables, several other variables and combinations of variables were examined in preliminary models in order to determine the variables most significant to the deficit. Some variables, such as the number of pensioners, the size of the labor force, and total population were eliminated from the model because, when added to the model, each individual p-value exceeded .05 at 95% confidence-levels, meaning that the variable did not have a significant relationship with the dependent variable, the deficit.

One suggestion as to why the number of pensioners did not greatly affect the deficit in this model is due to the nature of the pay-as-you-go (PAYG) system. It has only been recently, since the baby boomers have reached the age of retirement in 2007, that the support ratios have become unbalanced, thus threatening the PAYG system and

increasing the deficit. The number of pensioners has not, until recently, impacted the deficit because, historically, there has always been a sufficient number of workers per pensioner, and if there were above-average increases in pensioners in a given year, contribution rates were manipulated so as to avoid a substantial deficit within the system.[59] Because the support ratios did not begin to change significantly until 2007, the model did not detect a significant relationship between the number of pensioners and the deficit. For this reason, the number of pensioners was removed from the model. The same is to be said concerning the labor force size and total population.

B. Critical Assumptions of the Model

The model I have developed relies on several critical assumptions. They are as follows:

i. All cohorts retire at the minimum retirement age,

ii. Each pensioner works and contributes for exactly forty years prior to retirement, and

iii. The measures of reform are implemented from base year 2008.

Although the French National Assembly signed the reform of 2010 into law in November of 2010, this study calculates changes in the variables relative to the conditions of 2008 because it is the year that the COR report used as its base-line scenario.

[59] The contribution rate for a given year is calculated as: (avg. pension from previous year) x (total number of pensioners) = (total number of contributors) x (equilibrium contribution). When calculating, the only unknown variable is the equilibrium contribution rate, meaning the contribution rate at which the aggregate pension system is balanced. Then, the same equation is applied to each individual pension fund (as I discussed in chapter one, French pensions are divided into funds based on occupation), inserting the individual fund's number of pensioners for that year, number of contributors, and the equilibrium contribution rate, leaving *pension* as the unknown variable. This allows for the total amount of pensions to be distributed that year to be determined. If and when there is ever a surplus in one fund, that money is transferred to a fund that is in deficit, due to disparities in growth and decline in certain industries (such as mining). This method of transferring funds to avoid deficit has become less effective as more and more funds are in deficit due to the substantial increase in pensioners, now that the leading edge of baby boomers has reached the age of retirement.

II. Data Description and Formulas

A. The Dependent and Independent Variables

This thesis uses the variables of reform discussed in the COR April 2010 report. The dependent variable is the deficit within the public pension system, CNAV, and is measured in billion euros. The model uses the data provided by the International Labor Organization and Eurodata Database on the cost of Social Security for the years 1974 to 1993.[60] For the years 1994 to 2009, the data concerning the deficit was drawn from the Commission des Comptes de la Securité Sociale.[61]

The independent variables are as follows:

- Average pension benefit$_t$,
- Obligatory contribution rate$_t$,[62] and
- Minimum retirement age$_t$,

where *t* represents any given year. The model draws its data of the average yearly pension benefit for the years 1974 to 1990 from the International Labor Organization and Eurodata Database on the cost of Social Security. The Commission des Comptes de la Securité Sociale and the Institut Nationale de la Statistique et des Etudes Economiques (INSEE) provided the average yearly pension from 1994 to 2009. The yearly

[60] ILO/EURODATA: Database on 'The Cost of Social Security (1949-1993)'. Geneva/Mannheim, 2001. http://mzes162.mzes.uni-mannheim.de/projekte/coss/main.htm.
[61] Commission des Comptes de la Securite Sociale, "30 Ans de la Securite Sociale," accessed February 5, 2011, http://www.securite-sociale.fr/chiffres/ccss/2009/30ans_css.pdf.
[62] Contributions are withdrawn automatically through payroll taxes.

contribution rates were drawn from the INSEE database of social legislation.[63] The minimum retirement age is incorporated into the model in terms of life expectancy at retirement. The French life expectancies at retirement from 1974 to 2009 were provided by INSEE.[64]

B. The COR Reforms

According to the COR report, reforms involving pension benefits, contribution rates, and retirement age will be required by 2020, 2030, and 2050 in order to reach and to maintain equilibrium within the system. These reforms are not alternatives to each other. COR recommends that all three reforms be put in place successively, and my model analyzes their implementation in terms of their impact on the deficit and intergenerational equity.

Each wave of reform suggested by the COR report is measured as having been initiated from the year of the conclusion of the previous reform and as having been fully implemented by the given year of the reform. The study maintains the assumptions of scenario B as defined by the COR report (Table 2.3), which projects long-term unemployment at 4.5 per cent and long-term productivity at 1.5 per cent. The projected reforms are referred to as 2020, 2030, and 2050, and the reference year is 2008. The reforms proposed by COR are as follows.

i. Reform 2020 is initiated in 2010 and is fully implemented in 2020. This reform decreases the average pension benefit by 3.5 per cent, increases the

[63] Institut National de la Statistique et des Etudes Economiques, "Plafond mensuel de la Sécurité sociale (brut, net, coût salarial) depuis 1950," accessed January 3, 2011, http://www.insee.fr/fr/publications-et-services/.
[64] Institut National de la Statistique et des Etudes Economiques, "Estimations de Population et Statistiques de l'Etat Civil," INSEE, accessed January 23, 2011, http://www.insee.fr.

contribution rate by 4.2 points, and raises the retirement age by one year between 2010 and 2020.

ii. Reform 2030 is initiated in 2020 and is fully implemented in 2030. This reform decreases the average pension benefit by 5.2 per cent, increases the contribution rate by 1.4 points, and raises the retirement age by one-half year between 2020 and 2030.

iii. Reform 2050 is initiated in 2030 and is fully implemented in 2050. This reform decreases the average pension benefit by 6.9 per cent, increases the contribution rate by 0.4 points, and increases the retirement age by one-half year between 2030 and 2050.

Table 3.1 summarizes the reforms proposed by COR.

Table 3.1 Reforms Suggested by the COR April 2010 Report to Reach Financial Equilibrium within CNAV*

CHANGE FROM BASE YEAR 2008	**Average Pension**	**Contribution Rate**	**Retirement Age**
Reform 2020	-3.5 %	+ 4.2 points	+ 1 year
Reform 2030	-8.7 %	+ 5.6 points	+ 1.5 years
Reform 2050	-15.6 %	+ 6.0 points	+ 2 years

*Note: These reforms are implemented successively, and all changes are from the conditions of base-year 2008. *Source: COR April 2010 report.*

III. Discussion of the Empirical Results

A. The Impact of Each Variable on the Deficit

The regression equation derived from the regression model discussed in section I is as follows:

$$Deficit_t = -5.298 + .0001108x_{Total,t} - 1.283x_{Con,t}. \quad (3\text{-}5)$$

This study uses the coefficients of the independent variables in the model to predict the effect of each COR reform on the deficit. Recall that each reform is relative to the conditions of 2008.

Table 3.2 The Relation between the Deficit within the Caisse National d'Assurance Vieillesse (CNAV) and the Variables of Reform: Total Pension Benefit and Contribution Rates

Independent Variables	Dependent Variable: Deficit within CNAV (in Billion €)				
	Coefficient	*t*	*Std. Error*	*F-test*	*p-value*
Constant	-5.298**	-3.22	(1.644)	23.54	0.0000
Total Pension Benefit	.0001108**	4.3	(.0000258)		
Contribution Rate	-1.283**	-3.03	(.423)		
No. of Observations = 36					

Note: **Statistically significant at the .05 level (two tailed t-tests).

The regression model predicts that, holding all other variables constant:

- A one-hundred euro increase in the average pension of year *t* increases the deficit by 110 million euros;
- A one-year increase in the length of retirement decreases the deficit by 1.6 billion euros;
- A one-point increase in the contribution rate decreases the deficit by 1.3 billion euros.

These results clearly indicate that a one-unit change in the retirement age has the greatest impact on the deficit. The regression equation (3-5) provides a mechanism to calculate the deficit within CNAV for year *t* by plugging in the average pension benefit, life expectancy at retirement, and contribution rate for year *t*. Table 3.3 shows the change in the deficit after each reform proposed by COR. The deficit was calculated by inserting the average pension benefit and contribution rate proposed by COR into the regression equation (3-5), as well as projected life expectancies at retirement.

Table 3.3 Projected Deficit Levels in CNAV after COR Reforms, in Billion €

IN BILLION EUROS	**Total Deficit after Reform**	**Total Change in Deficit**
Year 2008	-4.68	-
Reform 2020	-0.1	-4.6
Reform 2030	2.2	-6.9
Reform 2050	2.7	-7.4

Calculated using Regression Equation (3-5)

As table 3.3 illustrates, implementation of the proposed COR reforms will result in a surplus within CNAV between the reforms of 2020 and 2030. The results of the regression equation demonstrate that it is possible to calculate the effect of each variable of reform proposed by COR on the deficit. Furthermore, the coefficients derived from regression analysis allow us to determine which variables bear the most influence on the deficit. As the data shows, one-unit changes in length of retirement and contribution rates have a greater relative impact on the deficit than changes in average pension benefits. These conclusions open the door to an examination of whatever discrepancy might exist between the ideological foundations of the French public pension system and its realization today. The results revealed in this chapter will be used as a launching pad in chapter four to explore the impact of pension reform on intergenerational equity.

Chapter 4:
Achieving Intergenerational Equity through Public Pension Programs

In light of the conclusions presented in chapter three, the focus of the thesis now shifts to the more abstract notion of intergenerational solidarity. Whereas the previous chapter focused on the specific reforms proposed in the COR report of April 2010, this chapter proposes alternative reforms, based on the variables proposed by COR, to evaluate whether or not the deficit might be eliminated in a manner that also promotes intergenerational solidarity in the public pension system. This thesis takes the position that an equitable pension system is one in which the costs of funding are spread evenly across generational cohorts.

Because of the esoteric nature of solidarity, a quantitative model can neither capture nor measure the essence of solidarity in a pension system or in pension reform. For this reason, this chapter aims to address the issue of solidarity by examining intergenerational equity in terms of contributions to the pension program relative to benefit from the program for each generational cohort (I- IV), as well as in terms of minimizing the deficit in order to reduce the cost imposed on future generations. It will be determined whether any of the cohorts "gets more out of the system" than another in terms of benefits relative to contributions. Afterwards, the chapter will explore alternative reforms that might be more equitable in the sense that a pensioner receives a benefit proportional to what he or she contributed to the system, while also reducing the deficit.

I. The Four Generational Cohorts

The four generational cohorts examined in this study are grouped based on the year of retirement based on 2008 conditions as well as on which of the projected reforms 2020, 2030, or 2050 affects each cohort at the time of retirement, in terms of pension benefits, contribution rates, and retirement age. Generally speaking, the cohorts are divided into roughly ten-year spans.

i. Cohort I includes those born between the years of 1946 and 1960. This cohort will only be affected by reform 2020. The year 1946 was chosen as the initial year to include in this study because it is the first year of the baby boom. The year 1960 is the last of cohort one because under the conditions of 2008, all will have reached the age of retirement by 2020.

ii. Cohort II includes those born between 1961 and 1969. This cohort will be affected by reform 2030, but not by reform 2050. Under the conditions of 2008, those born in 1969 will have reached the age of retirement by 2030.

iii. Cohort III includes those born between 1970 and 1980. This cohort will be affected by reform 2050. Under the conditions of 2008, this cohort will have retired by the year 2040.

iv. Cohort IV includes those born between 1981 and 1989. This cohort will also be affect by reform 2050. Although the reform affecting cohort four is the same as cohort three, this cohort is included as part of the study because the impact of reform 2050 is different on it than it is on cohort three.

Table 4.1 summarizes the four generational cohorts.

Table 4.1 The Year of Birth, Year to Enter Retirement, and Year to Exit Retirement for Cohorts I-IV

ASSUMING 2008 CONDITIONS	**Year Born**	**Year to enter retirement***	**Year to exit retirement***
Cohort I	1946-1960	2006-2020	2036-2046
Cohort II	1961-1969	2021-2030	2047-2057
Cohort III	1970-1980	2030-2040	2058-2070
Cohort IV	1981-1989	2041-2049	2071-2080

*Note: The first year of cohort I will enter retirement in 2006 and the last year of cohort I will enter retirement in 2020, etc. The first year of cohort I will exit retirement in 2036 and the last year of cohort I will exit retirement in 2046, etc.

II. The Impact of Each COR Reform on Intergenerational Equity

Table 4.2 below exhibits the final change in each variable at the end of the COR reforms 2020, 2030, and 2050. To calculate the effect of the reforms on the generational cohorts, I applied a similar methodology as in chapter three. Using the regression equation (3-4) and COR's measures of reform, I projected future 1) pension benefit levels; 2) contribution rates; 3) lengths of retirement; and 4) deficit until 2080, when the last cohort will have, on average, exited from the pension system and no longer draw benefits.

Table 4.2 Projected Conditions within CNAV after COR Reforms

CONDITIONS AT END OF REFORM PERIOD	**Average Pension Benefit, Year**	**Retirement Age**	**Contribution Rate**	**Deficit (in Billion €)**
Year 2008	14,112 €	60 years	21.46 %	-4.68
Reform 2020	13,618 €	61 years	25.66 %	-0.1
Reform 2030	12,884 €	61 ½ years	27.06 %	2.2
Reform 2050	11,911 €	62 years	27.46 %	2.7

Calculated using Regression Equation (3-5) and COR Reforms.

The table above shows that the reforms proposed by COR will result in lower yearly average pension benefits from one cohort to the next. These reforms also require that each cohort retire later than the previous cohort. Furthermore, the reforms require each cohort to pay greater contributions than the previous cohort. As a result, the CNAV

budget will be near balanced by 2020. According to my projections, there will be a surplus within CNAV by 2030 if the COR proposals are implemented.

To measure the impact of reform 2020 on cohort I, this study first calculated the average pension benefit to be received each year throughout the retirement span of the cohort based on life expectancy (i.e. first year of cohort will enter retirement in 2012 and the last year of the cohort will be out of the system in 2046). I derived the average contribution rate for cohort I from the range of contribution rates of the forty years prior to the first year of the cohort's entering retirement until the final year that the cohort enters retirement (1972 to 2021). The total average pension benefit over the span of retirement is calculated as the sum of the average pension per year during the length of the retirement of the cohort (equation 3-5). Retiring at age 61, cohort I will benefit from the public pension system for an average of 24.7 years, resulting in a total pension benefit of 329,622 euros per pensioner. Thus, the pensioners of cohort I will receive an average yearly pension of 13,345 euros throughout the span of retirement. The average contribution rate of this cohort will be 18.8 per cent. Table 4.3 summarizes the effects of each reform on the cohorts using analogous calculations.

Table 4.3 Collective Effects of COR Reforms on Cohorts

	Retirement Age	Length of Retirement	Average Contribution Rate	Average Pension per Year	Total Benefit per Pensioner
Cohort I	61 years	24.7 years	18.8 %	13,345 €	329,622 €
Cohort II	61 ½ years	25.7 years	22.2 %	12,965 €	333,201 €
Cohort III	62 years	26.8 years	24.7 %	12,362 €	331,672 €
Cohort IV	62 years	28.5 years	26.4 %	12,196 €	347,586 €

Calculated using Regression Equation (3-5) and COR April 2010 report reform proposals.

A. The Relative Intergenerational Cost of Reform

In earlier chapters, the thesis discussed the centrality of the concept of intergenerational solidarity to the French public pension system. The French perceive solidarity not only as a secular means to develop the Republic's notion of *fraternité* in society, but also as the justification for the redistribution of national funds intergenerationally, as is made possible by the structure of the pay-as-you-go (PAYG) system. The concept of solidarity is so intrinsic to the pension system that both sides of the pension debate claim it as the basis for or against reform.

As shown in Tables 4.3 and 4.4, the relative cost of financing public pensions, in the form of contributions, increases from one cohort to the next. Whereas cohort I receives an average yearly pension benefit of 13,345 euros, cohort IV receives only 12,196 euros per year. While this decrease may seem to be small in comparison to what it achieves in eliminating the deficit, it comes at a high price. Not only does cohort IV receive a yearly benefit that is 8.6 per cent less than that of cohort I, cohort IV pensioners contribute at an average rate of 26.4 per cent, which is a 40.4 per cent increase from the contribution rate paid by Cohort I!

It should be noted, however, that increases in longevity offset decreases in yearly pension benefits from the COR reforms. Although cohort IV receives less yearly pension yet contributes more to the system than cohort I, the increase in life expectancy results in a larger total pension benefit for cohort IV than cohort I. At the end of the day, cohort IV receives 5.4 per cent more in total benefit than cohort I.

Table 4.4 Relative Cost of COR Reforms on Cohorts

	% Change in Average Contributions from Cohort I	% Change in Total Benefit from Cohort I	% Change in Yearly Pension Benefit from Cohort I
Cohort I	-	-	-
Cohort II	+ 18.1	+ 1.1	-2.9
Cohort III	+ 31.4	+ 0.6	-7.4
Cohort IV	+ 40.4	+ 5.4	-8.6

Calculated using Data from Table 4.2

II. Alternative Combinations of Reform

The COR report of April 2010 proposes three consecutive reforms—2020, 2030, and 2050. Chapter three demonstrated that these reforms would indeed eliminate the deficit, and the beginning of this chapter measured the result of the reforms for the cohorts. The question remains as to whether or not other, more equitable, solutions exist to eliminate the deficit and spread the cost of reform more evenly across the generations. In an effort to address this issue, I developed two alternative reforms for reforms 2030 and reform 2050.

I developed these alternative reforms in four steps. First, I calculated the impact of each COR reform on the deficit. Second, I held constant one variable of each COR reform while manipulating the other variables to see if the deficit could be made any closer to equaling zero. third, I chose the combinations of variables that resulted in the lowest deficit and lowest surplus and used these combinations as the basis for the alternative reforms I propose below. Lastly, from these combinations that resulted in a completely balanced budget, I chose two alternatives each for 2030 and 2050 that distributed the costs of reform more evenly across the generational cohorts (relative to the reforms proposed by COR). I do not propose any alternatives to reform 2020 because it

is the initial reform proposed by COR and its measures are quite modest, thus imposing little cost on the generational cohorts.

i. My proposed "Reform 2030-A" is initiated in 2020 and is fully implemented by 2030. This reform decreases the average pension benefit by 6 per cent, increases the contribution rate by 4.2 points, and raises the retirement age by two years from the 2008 levels.

ii. My proposed "Reform 2030-B" is initiated in 2020 and is fully implemented by 2030. This reform decreases the average pension benefit by 8.7 per cent, increases the contribution rate by 3.5 points, and raises the retirement age by two years from the 2008 levels.

iii. My proposed "Reform 2050-A" is initiated in 2030 and is implemented by 2050. This reform decreases the average pension benefit by 8.7 per cent, increases the contribution rate by 5.56 points, and raises the retirement age by three years from the 2008 levels.

iv. My proposed "Reform 2050-B" is initiated in 2030 and is fully implemented by 2050. This reform decreases the average pension benefit by 12 per cent, increases the contribution rate by 4.44 points, and raises the retirement age by three years from the 2008 levels.

Applying the alternative reforms to the model,

$$Y_t = \beta_0 + \delta x_{Total,t} + \varphi x_{Con,t'} \quad (3\text{-}3)$$

it is possible to calculate the change in deficit. Reform 2030-A eliminates the deficit by 2030. Reform 2030-B results in a 200 million euro surplus by 2030. Both Reforms 2050-A and 2050-B maintain the surplus within the pension system. In 2050, a five-

million euro surplus results from reform 2050-A, and a 300 thousand euro surplus results from Reform 2050-B. These results are summarized in Table 4.5 below.

Table 4.5 Measures of Alternative Reforms

CHANGES FROM 2008 CONDITIONS	**Average Pension per Year (% change)**	**Contribution Rate**	**Retirement Age**	**Deficit at end of Reform period (in Billion €)**
COR Reform 2020	-3.5	+ 4.2 points	61	-0.106
COR Reform 2030	-8.7	+ 5.6 points	61.5	2.19
Alternative 2030-A	-6.0	+ 4.2 points	62	0.001
Alternative 2030-B	-8.7	+ 3.5 points	62	0.2
COR Reform 2050	-15.6	+ 6.0 points	62	2.7
Alternative 2050-A	-8.7	+ 5.56 points	63	0.005
Alternative 2050-B	-12.0	+ 4.44 points	63	0.0003

Calculated using Regression Equation (3-5) and my alternative reform proposals.

The range of alternative reforms is not limited to this list. These four alternative reforms were simply selected to exemplify that the variables of reform can indeed be manipulated so as to redistribute the cost of reform. I chose to incorporate these specific alternative reforms because the weight given each variable results in a balance as near to zero as possible. In choosing the alternative reforms, combinations that resulted in large surpluses were manipulated so that those budget surpluses might be used to instead decrease the contribution rate or increase the average pension benefit.

Reforms 2030-A, 2030-B, 2050-A, and 2050-B result in greater costs for each cohort relative to base year 2008, but the increases in cost are not as drastic as the original reforms proposed by COR. Assuming a scenario in which reforms 2020, 2030-A, and 2050-A are successively implemented from 2010 to 2050, the average yearly pension decreases by 3.9 per cent between cohort I and cohort IV (compared to a 8.6 per cent decrease under the COR reforms). In this scenario, the contribution rate increases

38.8 per cent between cohort I and cohort IV (compared to 40.4 per cent increase from the COR reforms), and the retirement age increases from 61 to 63. Table 4.6 summarizes the effects of the alternative reforms 2030-A and 2050-A on each cohort.

Table 4.6 Effects on Cohorts from Reforms 2020, 2030-A, and 2050-A

	Average Contribution Rate (C)	% Change in C from Cohort I	Total Pension Benefit (Total)	% Change in Total from Cohort I	Average Pension per Year (p)	% Change in (p) from Cohort I
Cohort I	18.5 %	-	330,401 €	-	13,366 €	-
Cohort II	21.8 %	+ 17.9	329,181 €	-0.4	13,078 €	-2.2
Cohort III	24.4 %	+ 31.9	320,780 €	-2.9	12,914 €	-3.4
Cohort IV	25.7 %	+ 38.8	339,872€	+ 2.9	12,840 €	-3.9

Calculated using Regression Equation (3-5) and my alternative reform proposals.

Assuming a scenario in which reforms 2020, 2030-B, and 2050-B are implemented from 2010 to 2050, the average yearly pension decreases by 5.4 per cent between cohort I and cohort IV. The contribution rate increases by 37.4 per cent, and the retirement age increases from 61 to 63. Unlike the COR reforms, increases in the retirement age are not offset by increases in longevity. For this reason, the total pension benefit for cohorts II and III decreases as a result of the alternative reforms, but not as much as the COR reforms. Table 4.7 summarizes the effects of alternative reforms 2030-B and 2050-B on each cohort.

Table 4.7 Effects on Cohorts from Reforms 2020, 2030-B, and 2050-B

	Average Contribution Rate (C)	% Change in C from Cohort I	Total Pension Benefit (Total)	% Change in Total from Cohort I	Average Pension per Year	% Change from Cohort I
Cohort I	18.5 %	-	324,510 €	-	13,127 €	-
Cohort II	21.8 %	17.9	320,006 €	-1.39	12,714 €	-3.2
Cohort III	24.3 %	31.3	310,375 €	-4.36	12,495 €	-4.8
Cohort IV	25.4 %	37.4	328,567 €	+1.2	12,413€	-5.4

Calculated using Regression Equation (3-5) and my alternative reform proposals.

III. Can Solidarity Justify Reform?

Although it is debatable whether or not equity can be assigned a numerical value, examining the relative cost of the alternative reforms on each cohort provides a means to evaluate the fairness of the COR reforms. Using the alternative reforms, it can be argued that certain combinations of variables allow for the burden of financing the public pension system to be distributed more evenly across generations. This thesis takes the position that a more even distribution of the cost of public pensions is a more equitable system.

The implications of the COR reforms and the alternative reforms raises the question of what constitutes fairness. In terms of average total benefit, the COR reforms are superior to the alternative reforms I proposed in the sense that total benefit increases from cohort to cohort. However, these increases in total benefit—which result from increases in longevity off-setting decreases in average yearly pension benefits—come at a very steep price. As illustrated in Table 4.3, the COR reforms encumber cohort IV with an average contribution rate that is 40.4 per cent greater than that paid by cohort I. Is that price worth a mere 5.4 per cent increase in total benefit?

The problem with the alternative reforms I developed is that increases in life-expectancy do not outpace increases in the retirement age until 2050. Under the conditions of these reforms, cohort IV is the only group to receive more total benefit than cohort I. Two factors account for this result. First, by the time cohort IV reaches retirement, there is suddenly a huge increase in life-expectancy at age of retirement, relative to cohorts I through III. Secondly, the decrease in average yearly pension benefit becomes less and less drastic from one cohort to the next. Nevertheless, the increase in

total benefit for cohort IV even under the conditions of the alternative reforms is not as great as it is under the conditions of the COR reforms.

The perception of pension benefits over the short-term versus the long-term present another issue when it comes to pension reform. Because individuals cannot predict their longevity, they might oppose measures that decrease average pension benefits per year, regardless of whether they will ultimately receive a greater total benefit in the end due to increases in life expectancy. From this perspective, one might view pensions intragenerationally, where differences in mortality result with the redistribution of funds within a given generation. A person who lives longer than another inevitably receives a greater total benefit from the system. Although it is not within the scope of this thesis, it is important to understand that intergenerational solidarity is only one side of the pension debate. Intragenerational equity involves a completely separate, yet indispensable, perspective on the issue of fairness within pension programs.

Whether a person prefers a greater total benefit or more generous yearly pensions presents several implications for the politics of reform. In the end, it is about the trade-offs a person is willing to make. One person might be willing to receive a lower yearly pension benefit in return for an earlier retirement. Another might prefer to work additional years in order to qualify for a more generous pension. Such options do exist within pension systems around the world.

Periods of pension reform in the past indicate that, when faced with nation-wide reform, the French will oppose changes in retirement age more than they will changes to average yearly pension, and that they will object to both of these variables more than they will to changes in contribution rates. As argued earlier, this can be attributed to

perceptions of the benefit one receives over the short-term and long-term. This outcome is ironic, considering that chapter three of this thesis proved that a one-year increase in the retirement age decreases the deficit by 1.6 billion euros. The retirement age has more impact on the deficit than the other two variables combined. The public mobilization surrounding the reform of 2010 showed that raising the retirement age is the reform that the French are least willing to accept, although it is the most effective measure to reduce the deficit. President Nicolas Sarkozy did, however, succeed in passing his reform. Chapter five explores the conditions that allow for the success of unpopular policy such as pension retrenchment.

Chapter 5:
The Politics of Pension Reform in France

In 2010, the French government passed pension reform despite public opposition. The most controversial measure of the reform involved raising the minumum retirement age from 60 to 62. The projections made in previous chapters suggest that retirement age carries the greatest influence on the fiscal deficit within the French pension system. However, chapter four concluded that, due to perceptions of total benefit, yearly benefit, and longevity, the French are most likely to oppose changes associated with the retirement age than they are to changes in pension benefit and contribution rates. Although this thesis emphasizes the economics of pension reform and intergenerational solidarity, an examination of the politics of reform will allow this thesis to make a full-circle, ending, as it began, with the controversy surrounding the 2010 reform.

Following the publication of the Conseil d'Orientation des Retraites (COR) report in April 2010, the French government announced that it would pursue measures to combat the rising deficit associated with public pensions. In response to the government's announcement, many French citizens took to the streets in what would be the largest and longest running series of strikes in over a decade.[65] Public mobilization against pension reform is not uncommon in France—in fact, each reform of the past two decades has been met with opposition, often expressed in the form of strikes within the public sector. In light of the unambiguous public sentiment against reform, how is it that the government has successfully implemented three of the past four reform proposals?

[65] *TF1 News*, "Manifestations : Guerre des Chiffres," September 24, 2010, accessed September 28, 2011, http://lci.tf1.fr/economie/social/2010-09/retraites-legere-erosion-dans-la-rue-6076144.html.

Until the 1990s, changes to the pension system in France generally involved expansion, such as increases in pension entitlements and decreases in the retirement age.[66] In 1993, however, the Balladur reform marked the end of expansion and the beginning of pension retrenchment. Whereas expansion involves the implementation of policies generally accepted by the public and tends to create interest groups, retrenchment often requires elected officials to pursue unpopular policies, defined by political scientists as those failing to capture the median voter, and to face the opposition of well-entrenched interest groups.[67] In other words, the gain for society as a whole is often outweighed by the loss felt by a concentrated and well-organized group of voters.

I. Political Reasons for Pension Reform

Despite the unpopularity of pension retrenchment, there are many political reasons for such reform. First, economic conditions can inspire politicians to pursue reform, especially if there is an economic crisis. The presence or the absence of an economic crisis can make or break the success of a proposed reform, because crisis helps convince policy makers and the public that retrenchment is necessary. Furthermore, the degree of retrenchment will often depend on the level of economic difficulties.[68] Political shifts to the right are a second cause of retrenchment, an example being the Juppé reforms of 1995. Lastly, rising costs associated with maturing welfare states can serve as a catalyst for pension retrenchment. As will be discussed later in this chapter,

[66] Pourcel, *La Protection Sociale*, p. 62.
[67] Pierson, *New Politics*, p. 144.
[68] Green-Pedersen, "Welfare-Retrenchment," p. 966.

the French government has increasingly drawn attention to the rising cost of pensions, especially as the leading edge of the baby boom has reached retirement.

II. Factors Influencing the Outcome of Reform

Just as economic conditions, political shifts, and rising costs are causes for retrenchment, certain factors influence the outcome of movements to reform pensions. Drawing on the literature on the politics of pension reform,[69] this chapter will look at the role of three factors in the success and failure of pension reform in France: Economic necessity, institutional context, and discourse. While this list is not exhaustive, these factors are prominent within the literature on pension reform and they do provide a considerable amount of insight into the reasons France has successfully implemented reform, specifically retrenchment, in the past two decades.

A. Economic Necessity

Economic necessity is perhaps the most obvious factor that will influence the success or failure of reform, since it is also motivates politicians to pursue reform. The Balladur reform of 1993, the Fillon reform of 2003, and the reform of 2010 demonstrate the weight of economic conditions on the success or failure of a reform proposal.

Several external economic factors influenced the success of the Balladur reform in 1993. First, the political volley between left- and right-wing governments, which had manifested itself throughout the 1980s in the form of sporadic periods of nationalization and privatization, weakened the French economy in the early 1990s.[70] Secondly, many

[69] Green-Pedersen, "Welfare Retrenchment"; Pierson, *New Politics*; Schmidt, "Discourse"; Schmidt, *European Capitalism.*
[70] Pourcel, *La Protection Sociale*, p. 55.

European nations faced economic recessions in the years leading to the Maastricht Treaty in 1992. Coupled with the growing pressure to adhere to the fiscal criteria established in the treaty, the French government argued for the economic necessity of pension reform. The French regarded cutbacks in its welfare state as a necessary step toward fulfilling their commitment to European integration and the monetary union.

In a similar manner, the Fillon reform in 2003 followed a period of economic uncertainty as the French adopted the euro as its sole currency in 2002, during a minor recession. Polls indicate that the French not only viewed the eurozone with skepticism, but they also held the euro responsible for perceived inflation. In reality, as research shows, the introduction of the euro had little effect on inflation rates.[71] Nevertheless, faced with imaginary inflation from the introduction of the euro and job uncertainty from the recession, the Fillon reform was passed during a period in which the French placed little confidence in their economy and feared the growing deficit associated with the public pension system.

The reform of 2010 is perhaps the best example of economic necessity enhancing the chances for success of a reform. The sole reason the French pursued this reform and eventually implemented it is because of the economic recession of 2008 and the COR publications that followed. Had it not been for the financial recession, it can be argued that pension reform would not have been pursued until 2012, after the scheduled

[71] *BBC News*, "French Economy in Trouble," August 20, 2003, accessed March 16, 2011, http://news.bbc.co.uk/2/hi/business/3165999.stm.

publication of the five-year COR report. Instead, because of the recession, COR prematurely published a report urging the government to take action in 2010.[72]

In contrast to the successful passage of the reforms discussed above, the Juppé reforms in 1995 failed to pass, in part because urgent economic necessity was not a primary rationale for pension retrenchment. Instead, the government pursued pension reform as part of a larger, more comprehensive reform including healthcare and education, a broad reform initiative of the recently elected conservative Jacques Chirac as president in 1995, ending fourteen years of socialist presidency.[73] Although the absence of an economic crisis does not sufficiently explain why the proposed reform failed, it must be noted that the government did not even use economic necessity as an argument for reform.

B. Institutional Context

The institutional context, defined as the principal policy actors' ability to impose or negotiate change, also plays an important role in the success or failure of reform. The ability of principal policy actors (in particular chief executives) to implement reform often depends on whether the institutional context is a single- or multi-actor system and on the presence or absence of multiple "veto points" in the policy process.[74] The French government falls within the category of a single-actor system due to the strong executive branch that characterizes French political processes.[75]

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[72] Conseil d'Orientation des Retraites, "Retraites: Perspectives Realisees a Moyen et Long Terme en Vue du Rendez-Vous de 2010—Huitieme Rapport."
[73] Pourcel, *La Protection Sociale*, p. 61.
[74] Schmidt, *European Capitalism*, pp. 62-64.
[75] Mark Kesselman and Joel Krieger ed., *Introduction to Comparative Politics* (New York: Houghton Mifflin Company, 2003): 106.

Because France has a single-actor system and virtually no veto points in the policy process, the president is a very strong chief executive and can basically impose reform even over the objections of important economic and social actors. This helps explain why the various pension reforms discussed above have passed, including in 2010, despite considerable public mobilization against reform. The question then arises, if the president can simply disregard strikes and the threat of veto-points and impose reform, why did reform fail in 1995?

The reform in 1995 did not fail because French people were against reform per se—according to an opinion poll taken that year, the majority of French accepted that the government had to put into place drastic social security reforms.[76] Instead, the French protested against the reforms because they objected to the process by which reform had been pursued. In particular, the government had failed to not only adequately communicate to the public how the reforms might legitimately fit with values of "social solidarity" but also to inform the most interested parties of the proposed policies, let alone bring them into the construction of the policies themselves. In the words of Vivien Schmidt, Minister Juppé's attempt to reform public sector pensions was a throwback to the old "statist" approach of imposing "heroic" reform without prior consultation.[77] The economy greatly suffered from the public sector strikes, forcing Juppé to abandon his reform policy.[78]

[76] Schmidt, "Discourse," p. 23.
[77] Vivien A. Schmidt, *From State to Market? The Transformation of French Business and Government*, (New York: Cambridge University Press, 1996).
[78] Pourcel, *La Protection Sociale*, p. 54.

C. Discourse

Finally, discourse, defined as the ability to change preferences by altering perceptions of economic vulnerabilities and policy legacies and thereby enhancing political institutional capacity to impose or negotiate change, is a less common but more recent theme in the literature of the politics of pension reform.[79] Vehicles of discourse could be any form of communication between the government and the public, such as speeches, party platforms, public debates, and media commentary.

Three types of arguments must be employed in order for discourse to successfully influence the chance of reform. First, a government must communicate the necessity of a reform through the use of cognitive arguments. The examples of economic necessity discussed earlier serve to illustrate the importance of the argument of necessity. However, in order for a cognitive argument to prevail, it must be supported by persuasive normative arguments. Schmidt argues,

> Where the discourse has contained not only sound economic reasons but also convincing normative arguments, for example…that changes in the welfare state that make for a more competitive economy would also promote a more equitable distribution of public goods (such as) in France since 1997…the discourse has contributed to the success of reform efforts.[80]

Lastly, discourse must appeal to values, such as national solidarity and public good.[81] The appeal to values has, in particular, shaped the discourse employed by the Sarkozy administration in 2010. Throughout his campaign for pension reform, intergenerational solidarity surfaced as the major theme in his urging of the French to

[79] Schmidt, "Discourse," p. 2.
[80] Ibid., p. 4
[81] Ibid., p. 6

accept reform. The government repeatedly emphasized the fact that the pay-as-you-go system, in which the young generation supports the old, is the essence of intergenerational solidarity, and that failing to act now and thereby leaving an immense debt for the younger generations to pay is not only unjust but it also contradicts the very notion of solidarity.[82]

III. France: Predisposed for Pension Reform

In the past two decades France has succeeded in passing pension reform with relative ease and frequency compared to other post-industrial countries. The presence of economic necessity, the institutional context of a strong chief executive, and the availability of a discourse on intergenerational solidarity establish the appropriate circumstances in which pension reform might take place in France. Other countries, such as Denmark and New Zealand[83] in the 1980s and 1990s, have been unsuccessful at passing pension reform due to unfavorable institutional contexts and unpersuasive discourse. And, even though the Netherlands and Germany have capitalist-corporatist welfare states such as France, each has faced more challenges in passing reform than in France because of their multi-actor structure of the government.[84]

The French reform in 2010 used, and effectively so, the discourse of solidarity in a way that none of the reforms of the past two decades did. In fact, such adamant application of intergenerational solidarity to pension reform had not been used since the

[82] Retraites 2010: Une Reforme Juste pour Chacun Entre Nous Official Government Website, "Pourquoi la Reforme en 2010?"
[83] Schmidt, "Discourse," p. 10.
[84] Ibid., p. 13.

initial years of social security. Even in this case, politicians used solidarity to promote pension expansion rather than retrenchment.

The application of solidarity in the 2010 reform changed the way future reforms will be perceived. It will no longer be viewed as a solution to other problems or as a cause of general economic problems. Instead, until intergenerational equity is reached concomitantly with fiscal sustainability, it will be perceived as the problem itself, and only parametric reform will provide the solution. Yes, the financial recession of 2008 gave cause for reform, but only in the sense that it expedited the urgency of reform—the government would have pursued pension retrenchment eventually, with or without the recession.

Because Sarkozy placed the emphasis of the reform on solidarity rather than economic necessity due to external factors, an external economic crisis will no longer be necessary in order for the government to pursue retrenchment. Furthermore, the quantification of solidarity will allow the government to justify pension retrenchment in the face of public opposition. Despite the public mobilization against pension reform, polls indicate that a majority of the French at the time believed that serious reform was inevitable in order for the public pension system, as a mechanism of intergenerational solidarity, to survive. Discourse involving intergenerational solidarity—because it can be quantified—will serve as a legitimizing force behind such pension reform.

Conclusion

The research of this thesis as presented in chapters three and four can support efforts to appeal to intergenerational solidarity through discourse. Using a model that measures the impact of variables of reform not only on the fiscal deficit of the pension system but also on cohorts of generations allows for the factors of economic necessity and of discourse to take on a new form. The model shows that solidarity can be quantified, in terms of the relative cost of and benefit from pensions to each cohort, and thus the argument for pension reform—as a goal in and of itself—becomes much more solid; the government need not pursue pension reform to address external economic factors, such as a recession because, after all, *any* government program can be adjusted to balance the government budget—pension retrenchment is not the sole solution to any external crisis such as the financial recession of 2008 or the minor recessions of the early 1990s.

With the papy boom on the horizon, the public pension system itself is in fiscal deficit. It is not a surprise that the French do not support pension reform that is designed to solve problems exogenous to the pension system—why give up something precious and to which you have entitlement if another group or program can make the sacrifice required for fiscal sustainability? On the contrary, the model proposed by this thesis argues that pension reform is necessary because of economic issues endogenous to the pension system. The pension problem is not limited to the fiscal deficit in and of itself. The problem is that the older generations are passing the bill of an enormous debt to the younger generations, some perhaps not even born yet. Fortunately, as my model shows,

this can be avoided simply by manipulating variables such as benefit levels, contribution rates, and retirement age.

For the success of future reforms, it is necessary that the government communicate to the public that pension reform is an on-going process. During the campaign for the 2010 reform, the government emphasized that the reform would be expired in 2018 when, hypothetically, the deficit would be eliminated. This approach will not suffice for the long-term horizon, however. In order to maintain equilibrium it will be necessary to reform the public pension program with respect to changes in demographics and in the economy.

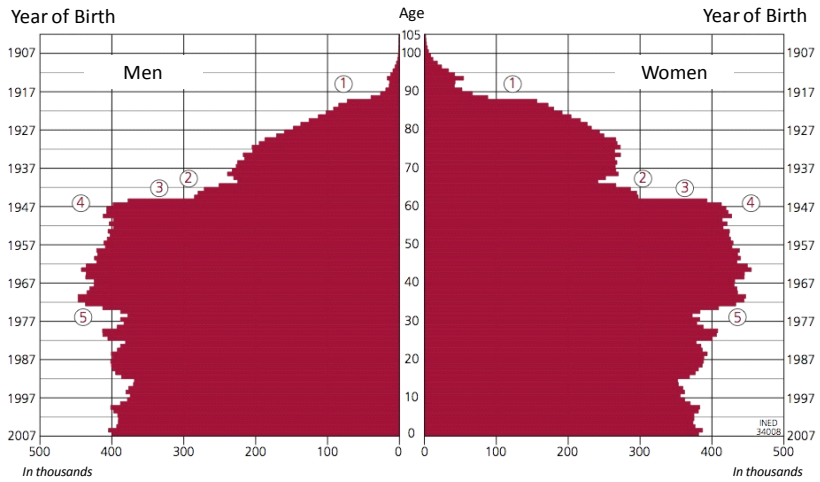
Policy makers must establish a persuasive discourse with the younger generations. It must be communicated to the young that if preventative measures are not pursued, the public pension system, through which intergenerational solidarity is meant to be achieved, will collapse. Intergenerational solidarity is threatened by its association with a financially unstable pension system. It must be communicated that intergenerational solidarity is not an accord to guarantee the government's unconditional support of an individual. It is a social contract with great unifying potential.

Due to its low retirement age, France is one of the first countries in the world to experience the economic and social effects of the papy boom. Although France has political advantages allowing for successful pension reform, other countries have an advantage in that their older legal retirement ages have delayed the shock of the papy boom. With the implementation of the 2010 reform, France has established itself as a model for pension reform.

Fiscal equilibrium within public pensions can be achieved in terms of intergenerational equity. The 2010 reform set the stage for the reconciliation of the two. Knowingly or not, the baby boomers' in government symbolically gave today's young what had been their greatest weapon for social liberation by employing a discourse of solidarity to pass reform legislation. It is now in the hands of the young generations today to fight for their economic liberation.

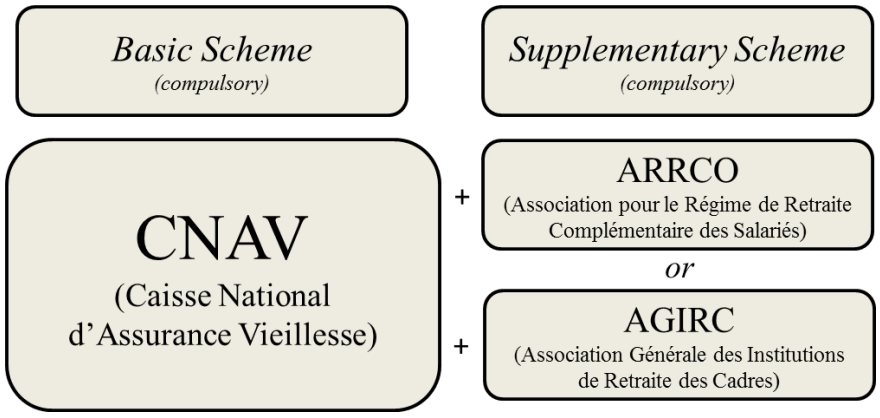
Appendix A

Graph 1: Population Pyramid of France, 2008



Source: Institut National des Etudes Demographiques
1) Low birth-rates during World War I; 2) Increasing fertility; 3) Low birth-rates during World War II; 4) Baby boom; 5) End of baby boom.

Figure 1.1 Two-Tier Scheme in the Pension System



Appendix A

Table 2.1 Projections of COR Report 2010*

	2006	2015	2020	2030	2040	2050
Expenditure on pensions (% GDP)	13.1	13.7	14.1	14.7	14.9	14.7
Mass contributions (% GDP)	12.9	13.0	13.0	13.0	13.0	13.0
Required annual funding (% GDP)	0.2	0.7	1.0	1.6	1.8	1.7
Expenditure on pensions (Bn €)	235.2	301.1	337.1	420.1	511.8	606.6
Mass contributions (Bn €)	231.0	286.0	312.2	373.0	448.4	537.8
Required annual funding (Bn €)	-4.2	-15.1	-24.8	-47.1	-63.4	-68.8

Source: Adapted From COR April 2010 report. The minus signs indicate a deficit. *Note: using 2006 euro.

Table 2.2 Assumptions of the COR Projections of the April 2010 Report

Fertility	1.9 children per woman
Mortality	Increase in life expectancy from birth (2000-2050) • 75.3 to 83.8 years for men • 82.8 to 89.0 years for women
Immigration	Net migration of +100,000 persons per year
Unemployment	4.5%
Productivity	Annual increase of 1.8%
Duration of contributions	Increase from 40 to 41 years in 2012, and to 41.5 years in 2020, maintaining 41.5 years until 2050
Evaluation of pensions	Linked to inflation

Source: Cor April 2010 report

Appendix A

Table 2.3 The Three COR Scenarios A, B, and C

		Long-term Productivity	
		1.8%	**1.5%**
Long-term Unemployment	**4.5%**	Scenario A	Scenario B
	7.0%		Scenario C

Source: COR April 2010 report

Table 2.4 COR Conditions for Equilibrium in the Pension System, Scenario B

CHANGE FROM BASE YEAR 2008	**Average Pension Benefit**	**Contribution Rate**	**Retirement Age**
Reform 2020	-3.5 %	+ 4.2 points	+ 1 year
Reform 2030	-8.7 %	+ 5.6 points	+ 1.5 years
Reform 2050	-15.6 %	+ 6.0 points	+ 2 years

Source: COR April 2010 report

Appendix A

Table 3.1 Reforms Suggested by the COR April 2010 Report to Reach Financial Equilibrium within CNAV*

CHANGE FROM BASE YEAR 2008	**Average Pension**	**Contribution Rate**	**Retirement Age**
Reform 2020	-3.5 %	+ 4.2 points	+ 1 year
Reform 2030	-8.7 %	+ 5.6 points	+ 1.5 years
Reform 2050	-15.6 %	+ 6.0 points	+ 2 years

*Note: These reforms are implemented successively, and all changes are from the conditions of base-year 2008. *Source: COR April 2010 report.*

Table 3.2 The Relation between the Deficit within the Caisse National d'Assurance Vieillesse (CNAV) and the Variables of Reform: Total Pension Benefit and Contribution Rates

Independent Variables	Dependent Variable: Deficit within CNAV (in Billion €)				
	Coefficient	*t*	*Std. Error*	*F-test*	*p-value*
Constant	-5.298**	-3.22	(1.644)	23.54	0.0000
Total Pension Benefit	.0001108**	4.3	(.0000258)		
Contribution Rate	-1.283**	-3.03	(.423)		
No. of Observations = 36					

Note: **Statistically significant at the .05 level (two tailed t-tests).

Table 3.3 Projected Deficit Levels in CNAV after COR Reforms, in Billion €

IN BILLION EUROS	**Total Deficit after Reform**	**Total Change in Deficit**
Year 2008	-4.68	-
Reform 2020	-0.1	-4.6
Reform 2030	2.2	-6.9
Reform 2050	2.7	-7.4

Calculated using Regression Equation (3-5)

Appendix A

Table 4.1 The Year of Birth, Year to Enter Retirement, and Year to Exit Retirement for Cohorts I-IV

ASSUMING 2008 CONDITIONS	**Year Born**	**Year to enter retirement***	**Year to exit retirement***
Cohort I	1946-1960	2006-2020	2036-2046
Cohort II	1961-1969	2021-2030	2047-2057
Cohort III	1970-1980	2030-2040	2058-2070
Cohort IV	1981-1989	2041-2049	2071-2080

*Note: The first year of cohort I will enter retirement in 2006 and the last year of cohort I will enter retirement in 2020, etc. The first year of cohort I will exit retirement in 2036 and the last year of cohort I will exit retirement in 2046, etc.

Table 4.2 Projected Conditions within CNAV after COR Reforms

CONDITIONS AT END OF REFORM PERIOD	**Average Pension Benefit, Year**	**Retirement Age**	**Contribution Rate**	**Deficit (in Billion €)**
Year 2008	14,112 €	60 years	21.46 %	-4.68
Reform 2020	13,618 €	61 years	25.66 %	-0.1
Reform 2030	12,884 €	61 ½ years	27.06 %	2.2
Reform 2050	11,911 €	62 years	27.46 %	2.7

Calculated using Regression Equation (3-5) and COR Reforms.

Table 4.3 Collective Effects of COR Reforms on Cohorts

	Retirement Age	**Length of Retirement**	**Average Contribution Rate**	**Average Pension per Year**	**Total Benefit per Pensioner**
Cohort I	61 years	24.7 years	18.8 %	13,345 €	329,622 €
Cohort II	61 ½ years	25.7 years	22.2 %	12,965 €	333,201 €
Cohort III	62 years	26.8 years	24.7 %	12,362 €	331,672 €
Cohort IV	62 years	28.5 years	26.4 %	12,196 €	347,586 €

Calculated using Regression Equation (3-5) and COR April 2010 report reform proposals.

Appendix A

Table 4.4 Relative Cost of COR Reforms on Cohorts

	% Change in Average Contributions from Cohort I	% Change in Total Benefit from Cohort I	% Change in Yearly Pension Benefit from Cohort I
Cohort I	-	-	-
Cohort II	+ 18.1	+ 1.1	-2.9
Cohort III	+ 31.4	+ 0.6	-7.4
Cohort IV	+ 40.4	+ 5.4	-8.6

Calculated using Data from Table 4.2

Table 4.5 Measures of Alternative Reforms

CHANGES FROM 2008 CONDITIONS	Average Pension per Year (% change)	Contribution Rate	Retirement Age	Deficit at end of Reform period (in Billion €)
COR Reform 2020	-3.5	+ 4.2 points	61	-0.106
COR Reform 2030	-8.7	+ 5.6 points	61.5	2.19
Alternative 2030-A	-6.0	+ 4.2 points	62	0.001
Alternative 2030-B	-8.7	+ 3.5 points	62	0.2
COR Reform 2050	-15.6	+ 6.0 points	62	2.7
Alternative 2050-A	-8.7	+ 5.56 points	63	0.005
Alternative 2050-B	-12.0	+ 4.44 points	63	0.0003

Calculated using Regression Equation (3-5) and my alternative reform proposals.

Table 4.6 Effects on Cohorts from Reforms 2020, 2030-A, and 2050-A

	Average Contribution Rate (C)	% Change in C from Cohort I	Total Pension Benefit (Total)	% Change in Total from Cohort I	Average Pension per Year (p)	% Change in (p) from Cohort I
Cohort I	18.5 %	-	330,401 €	-	13,366 €	-
Cohort II	21.8 %	+ 17.9	329,181 €	-0.4	13,078 €	-2.2
Cohort III	24.4 %	+ 31.9	320,780 €	-2.9	12,914 €	-3.4
Cohort IV	25.7 %	+ 38.8	339,872€	+ 2.9	12,840 €	-3.9

Calculated using Regression Equation (3-5) and my alternative reform proposals.

Table 4.7 Effects on Cohorts from Reforms 2020, 2030-B, and 2050-B

	Average Contribution Rate (C)	% Change in C from Cohort I	Total Pension Benefit (Total)	% Change in Total from Cohort I	Average Pension per Year	% Change from Cohort I
Cohort I	18.5 %	-	324,510 €	-	13,127 €	-
Cohort II	21.8 %	17.9	320,006 €	-1.39	12,714 €	-3.2
Cohort III	24.3 %	31.3	310,375 €	-4.36	12,495 €	-4.8
Cohort IV	25.4 %	37.4	328,567 €	+1.2	12,413€	-5.4

Calculated using Regression Equation (3-5) and my alternative reform proposals.

Appendix B

$$Deficit_t = Total\ Contribution\ Revenue_t - Total\ Pension\ Expenditure_t, \quad (3\text{-}1)$$

$$Deficit_t = f(average\ pension\ benefit_t, length\ of\ retirement_t, contribution\ rate_t) \quad (3\text{-}2)$$

$$Y_t = \beta_0 + \delta x_{Total,t} + \varphi x_{Con,t}, \quad (3\text{-}3)$$

$$Total\ Benefit_i = \sum_{i=r}^{d} f(p)_t \quad (3\text{-}4)$$

$$Deficit_t = -5.298 + .0001108 x_{Total,t} - 1.283 x_{Con,t}. \quad (3\text{-}5)$$

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