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Household deformation
trumps demand management
policy in the 21st century

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Household deformation trumps demand management policy in the 21st century

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ABSTRACT

Demographic impacts that will disrupt traditional demand management policy tools are examined. Given the demographics of aging, the lifecycle of consumption for a country, as well as an individual, this paper concludes that one of the key drivers of demand management policy will disappear from many of the wealthy economies over the next 30 years. Economists often speak of the liquidity trap justifying fiscal stimulus. The new mantra may become "forget the liquidity trap, it's the demographic trap" that weighs down the economy. As a result, systemic issues will loom large, affecting housing demand, development models, and portfolio valuations for many of the pension funds needed to support an aging population. Narrowly focused upon household (de)formation, the paper's analysis allows to draw wider implications of the impact of the aging populations.

1. INTRODUCTION

President William Jefferson Clinton was famous for the term "It's the economy, stupid," and Lord Keynes famously coined the term "the liquidity trap." With both in mind, politicians can justify spending to ensure sufficient demand. Even without reference to either term, central bankers can justify zero interest rates to stimulate demand, for the government to save us from slow growth, and thus stimulate us to buy more big screen televisions (only partially sarcastic). To those who believe we are all dead in the long run or that monetary policy can stimulate real growth via interest rate demand management policy, this paper will accept these concepts as truth, but only as a starting point. An essential premise of these types of government interventions to stimulate demand is that people will spend the money (much like Nancy Pelosi's comment concerning the benefit of greater welfare spending to help increase employment), thereby stimulating demand via the multiplier that will eventually cause greater real growth as the consumer consumes more. This leads to greater production, more jobs, and brings the economy out of the liquidity trap. Shop till we drop will solve all evils.

There is one glaring problem. The demographics of the 21st century make this type of policy less predictable, more likely to fail, and could lead to distortions much greater than expected by the central planners manipulating the system. Older populations do not buy as much "new stuff." They are selling old stuff, downsizing, using auction sites and dispensing with stuff, and thus not net accumulating. As such, stimulating demand via a policy to increase marginal consumption is less likely to work in a world of globally aging populations. This is especially apropos to Europe, Japan, the U.S., and China (in just a short period they will have an older population that is larger than the entire population of the U.S.). We are beginning to see the end of the "shop till we drop" generation. And, the problem is not just with the big economies. Many other advanced smaller economies, such as Korea and Russia, are aging rapidly. Add these counties together and we have most of the world's GNP. There is a bit left in poorer parts of the world, however, for the most part the consuming part of the world is getting old.

We examine the demographic impacts that may disrupt traditional demand management policy tools, given the demographics of aging, the lifecycle of consumption for a country, as well as a person, with specific emphasis on household formation, and draw the implications. With demand management as a tool that is less useful – **forget the liquidity trap, it's the demographic trap.**

The paper first establishes demographic links that heretofore may be ignored when estimating the impacts of fiscal expansion. They are the direction of population growth in the major consuming nations, the aging of that population, and the implications for new household formation (a key to making demand management stimulus work).

Second, it considers the implication of aging with respect to the potential for significant household **deformation** in most of the consuming world.

Finally, it considers the systemic risk implications of household deformation on export led development, demand management policy, potential GDP growth, and asset valuations.

2. POPULATION TRENDS IN DEVELOPED COUNTRIES

Many studies, mainline business programs, and the media have all finally awakened to the implications of aging societies. The "graying of America" is a theme that has become popular. The implications for Social Security funding, Medicare funding, rising medical costs, are all now widely discussed. Simply do a search for graying of America and article upon article discussing the demographic trends we face are highlighted. Thus, these trends are known. And, to some extent it is understood that the U.S., with its demographic challenges, is young relative to many other countries (immigration has been a major contributor to keeping it younger). Moreover, we are beginning to see more mainline recognition that countries, as well as individuals, have a "lifecycle" with respect to the optimum age distribution for relative productivity.[1]

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[1] Simply search on the internet for graying of America (http://bit.ly/2EQFADI) to get an idea of the amount of information available. With respect to the lifecycle discussion of a country see Silver and Wilford (2009) and Denby and Putnam (2017) for implications on productivity.

First consider the changing face of U.S. demographics. Figure 1 illustrates that the U.S. is moving from a young country (remember the 1960s) to a middle-aged country today. In 1960, 53% of the population was in the middle, older than 19 but younger than 65 years of age. In 2010 that number increased to 60% of the population, while the over 65 plus age group rose by 50% to almost 13% of the population. By 2050, projections suggest that the U S will be an old country. From a ratio of 19 and under to over 65 in 1960 of 4 to 1, the ratio has fallen to 2 to 1 by 2010 and is expected to fall much farther by 2050. More importantly, the middle group is the most productive. Yes, it will remain reasonably large but at the expense of the young, which are replaced by the old. As noted by Silver and Wilford (2009), it is the middle group that tends to have the relatively highest productivity (as well as savings and investments). Under 19 year olds are still consuming education, living off the society while not producing as a general statement. This fact tends to hold for over 65 as well, although the baskets of consumption goods tend to be very different. From a purely relative productivity perspective, one can observe that a country has a consumption-production lifecycle similar to that of the individual [Ando and Modigliani (1963)].

Germany and Japan were at their relative optimal demographic productivity (production focused ages relative to consumption ages) in the 1980s, while the U.S. was struggling to create jobs for a growing labor force. Political economics of the countries reflected these different realities. The U.S. needed to create net new jobs. In contrast, a steady state labor force existed in Germany and Japan, where similar numbers of individuals were leaving the labor force as were entering.

Today, as shown in Figures 2 and 3, the opposite situation exists, not from younger people entering the labor force in Germany and Japan, but by the intense graying of those countries, and indeed other European countries as well. This is laid out in Figure 4, which also includes data for Italy, one of the fastest aging European populations. In 1960, Italy and the U.S. had similar percentages of the population 65 and older with Japan younger still. By 2010 Germany, Japan, and Italy all had over 20% of their population over 65; the U.S. had creeped up, but only to 13%.

Figure 1: Changing face of U.S. demographics (1960-2010)
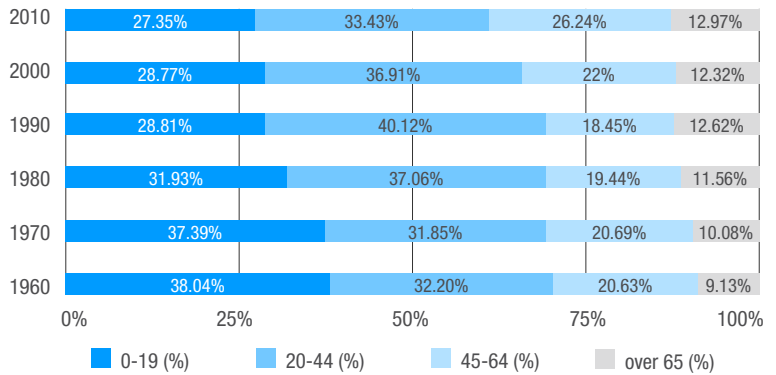
Figure 2: Changing face of German demographics (1960-2010)
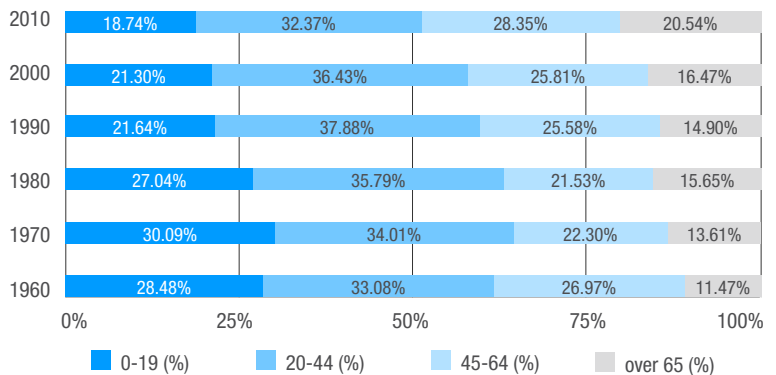
Figure 3: Changing face of Japanese demographics (1960-2010)
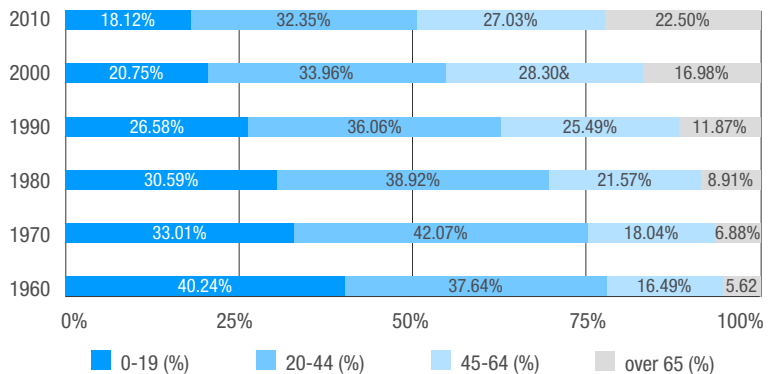
To grasp the extent of the problem, using U.N. forecasts, consider the same figures per above out to 2050 for Germany and Japan in Appendix 1.

Further, this is not just a European and Japanese phenomenon. Most middle-class OECD countries face this problem. The issue simply is when will it become a serious problem, not if. Figure 5 highlights this by looking at the percentage of the population of various high-income countries over 65 by the year 2050 (again, based upon U.N. projections).

China, although on net younger than the U.S. today, is expected to become "older" by 2040. As such, in just a short time, it faces similar demographic problems to those faced by Japan today. These demographic changes imply shifting consumption patterns, potentially lower productivity, as well as different political trends during the next decades.

Shifting demographics in the wealthy countries, the importing countries, have significant implications for development policies of those seeking to enter the OECD middle class club. Japan, South Korea, and China have used export led growth to propel themselves just as has Singapore and Hong Kong. Export led development requires other counties to be consumption driven. China is seen by many as the new consumer country, however, if it follows the pattern of demographic change forecasted, its older population may encounter the problems faced by Japanese during the 1990s, when the country entered a period of slow (often near negative) growth.

Figure 4: Percentage of population aged 65 years old and above
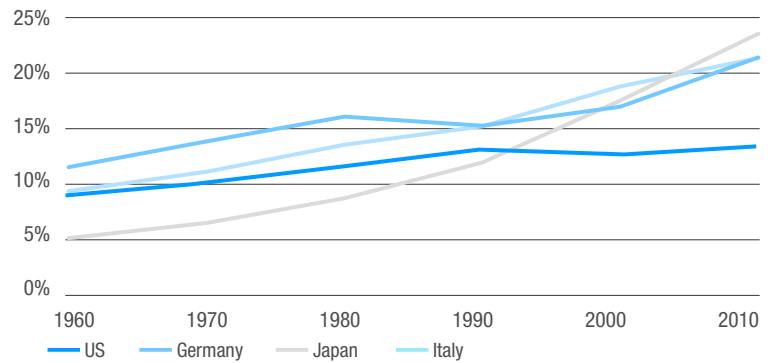
Figure 5: Percentage of population aged 65 years old and above: Projected
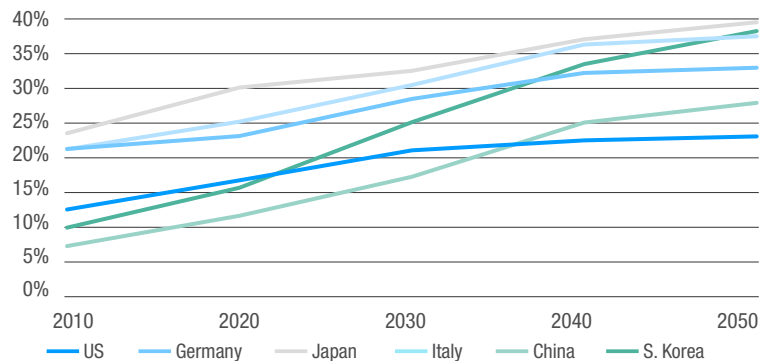
3. VEHICLE FOR CONSUMPTION-LED DEMAND – HOUSING AND HOUSEHOLD FORMATION

Since consumption-led demand can take many guises, it is impossible to choose one vehicle to model if we want to have an idea of demographic impacts on demand, as suggested above. In many cases, export-led growth occurs simultaneously with infrastructure and housing development. Separating the contributors to growth beyond simple accounting can be misleading. However, one indicator can be agreed upon as essential to generating demand: new demand for housing.

Housing demand may be driven by many factors. We can identify three distinctly different ones: (1) mass migration from the countryside as in China, (2) a growing population as in North America, and (3) rebuilding of housing after war (wars destroyed much of the housing stock in the latter half of the 20th century in Europe). Wealthy countries are not expected (hopefully) to be in a rebuilding situation resulting from war or a mass movement due to urbanization. It can be argued that the housing formation situation is stable and henceforth driven by real income and demographic factors. To the extent that China has entered the group of "wealthy nations," which could be a slight exaggeration, it will also experience a stabilization in demand for housing vis-à-vis the available population.[2]

To examine housing demand, consider what drives the demand for new housing (not necessarily replacement) beyond the factors noted above. And then ask whether or not, one can segregate the factors driving that demand. To do so, one has to start with net household formation. Households form naturally as a population grows, thereby creating demand for housing. To examine a historical set of data one should consider household formation in the context of a stable (not disrupted due to war) environment.

Considering these factors, we choose to examine household formation in the U.S. in an attempt to determine the demographic (as well as wealth) factors that drive its formation. Tertiary conclusions can be drawn from Figure 6. Data are presented by decade. Household formation is slowing as the demographic makeup of the population is changing. It is obvious when the baby boomers enter the picture and create new families.[3] It is also obvious that household formation is now sharply slowing.

Household formation is essential for demand management policies, consumption driven, to work effectively. Formation of a new household implies building living quarters, buying goods to service the house, as well purchasing the items associated with creation of a household. Demand management tools, demand for exports from manufacturing countries, demand for consumption goods in general such as cars and garages, increase as households are formed. If no households are formed the nature of demand is different. If no net new houses are built how much copper for roofs and wiring is needed, for example.

At this juncture note that household formation is not the same as net new housing units created. Household formation is a primary factor determining demand for housing; however, the number of housing units built are also impacted by wealth characteristics. The second-home phenomenon is no doubt driven by the growth in wealth per capita over time as well as demographics (distribution of the age of a population as well as the general level of the population). For households, with exception of the extremely wealthy, to have multiple dwellings is a sign of the general level of wealth per household that many western countries have now achieved. To predict net housing demand, one would not only consider household formation growth but also wealth and/or per capita income growth. This paper focuses on household formation predictions. Based upon U.N. statistics one can reliably make

Figure 6: U.S. households and growth rates 1960-2010

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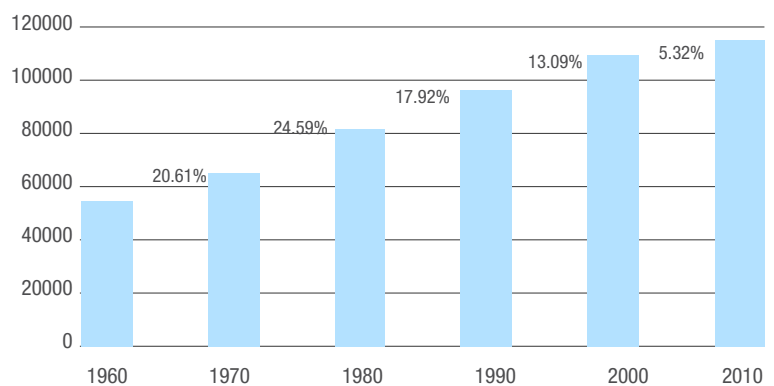
[2] We are intentionally ignoring the massive underdeveloped populations in Southeast Asia and Africa, as well as many of the Latin American countries, which have young, non-urban, populations. Our focus here is on the developed economies in an attempt to isolate the demand conditions that support export-led growth for those countries.

[3] It is also obvious when their importance begins to disappear. Many, as noted by Denby and Putnam (2017), believe that one last hurrah is in the offing as the millennials finally begin to build households, however this may be a blip in the trend.

some predictions about household formation and thus the general implications for housing demand. It does not, however, address the second home phenomenon directly, albeit a consideration that must temper certain conclusions about the general impact of overall household formation (deformation) on the number of units demanded.[4]

3.1 MODELING HOUSEHOLD FORMATION IN THE U.S.

In general, household formation is driven by general population changes and by the ratios of the subgroups. Children are important in household formation, but they do not build the household; their adult parents do. Retirees on net tend not to create new households, but the opposite. Although to the extent that life expectancy increases are embedded in the ratios of the percentage of the population over 65, evaluating how rapidly households are deformed may not be as simple as one may think.[5]

One may create a model of household formation that is primarily defined by the overall population and what age groups tend to dominate the population.

A simple representation of a model to describe household formation can be characterized by the following equation.

$$HH = f(pop, e^{ratio\ under\ 19}, e^{ratio\ 19-44}, e^{ratio\ 44-65}, e^{ratio\ 65+})$$

Where HH is the number of households, pop is the level of the population, and the four ratios represent the distribution of the population.[6]

Pop and HH are levels and the demographic ratios are, by definition, already in percentages.[7]

The ratios as stated in the above model can misleading, however. A better way to think about the ratios and how they impact household formation is to consider the ratios that define the relative size of one group to another, not just the whole. The primary group that creates new households is no doubt the 19 – 44 age group. The next group likely to create a new household resides in the 44-65 age category (for example divorce may actually create a new household while remarriage undoes some of these temporary households).[8] The under 19 age group and retirees tend not to create net new households, while death or institutionalization may be necessary for the latter group to dissolve a household.

As such, we rewrite the ratios for focusing on the relationship of the under 19 years to the middle of the age distribution as well as the over 65 relationship.

This model can be rewritten as:

$$HH = f(pop, e^{age\ 19}, e^{age\ 65}),$$

Where age 19 = (% of over 19 to 65)/(% of under 19) and age 65 = (% of over 19 to 65)/(% of over 65)

The model in dlog terms can be rewritten as

$$PCHH = B_1\ PCpop + B_2 dage\ 19 + B_3 dage\ 65 + \epsilon$$

Where: PC is % change and dage is the first difference.

To estimate the model, we use annual data from 1960 through 2015. The demographic data is from the U.N. demographic database. Household formation data is supplied by the U.S. census bureau. All data are publically available.[9]

The results can be summarized as follows:

	COEFFICIENT	ST. ERROR	T – STATISTIC
B_1	1.041809935	0.165162383	6.30779186
B_2	0.198783216	0.145397565	1.367170186
B_3	0.804582496	0.262737264	3.062308268

The intercept is forced to zero.

Summary statistics are:

MULTIPLE R	0.900878997
R-SQUARE	0.811582966
ADJUSTED R-SQUARE	0.78458622
STANDARD ERROR	0.00750248

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[4] Once household formation estimates are obtained one may consider this as a variable to model housing demand.

[5] We are focused on the U.S. at this point in the exercise, however, consideration of U.N. data for Russia provides a caution. Due to the declining longevity of the population, Russia is not expected to have as much of a growth in the above 65 portion of the population as in, say, Germany or the U.S. Shorter life expectancy or longer life expectancy are issues to consider in looking at the relevance of the ratios when comparing across countries.

[6] To repeat and highlight wealth is important for determining housing formation, less so for household formation. Underlying the data that will be deployed in estimating the model, however, is a basic assumption that the period covered for the U.S. starts with sufficient wealth to allow for smaller and smaller households. During most of the history of mankind multiple generations lived in the same household. With sufficient wealth, a household can become smaller as generations lived separately.

[7] Our modeling follows the typical of money demand equations that consider interest rates as a determining factor just as we consider ratios as determining factors.

[8] Paciorek (2015) describes multiple conditions that may impact household formation besides demographics.

[9] One criticism of this model could be that it does not have a wealth variable. Again, we are focused upon household formation not number of housing units in this formulation. However, in our estimations we did include it. The variable was insignificant as we would expect.

The fact that Coefficient 2 is insignificant is to be expected. More interestingly is the significance of Coefficient 3, supporting the notion that the aging process in reducing the ability for households to be formed (note that over 65 ratio is in the denominator) is more important than the number of those under 19. This may be because the key is the middle age group, from 20 – 65, which can create households rather than the number of children available to bring into the household.

Overall, the regression model appears to provide a reasonable explanation of household formation in the U.S. As such, we can utilize this simple model to forecast future household formation, given the demographic data from the U.N. Further, we will take the U.N. data for other countries and create a simple (recognizing its flaws) set of forecasts for the decades out to 2050 of household formation.[10]

4. FORECASTING BASED ON THE U.S. MODEL

Utilizing these estimates from the regressions above, we can build a forecasting model for U.S. household formation based upon the demographic makeup of the U.S. Figure 7 presents these forecasts. No doubt that these forecasts can be disputed on many grounds; however, the direction is clear. By 2040, net new household formation turns to deformation. Assuming a small bounce back toward 2050, household formation will have been very slow in thirty years. Moreover, the U.S. has (and will likely have) the best demographic outlook of all the countries analyzed.

Figure 7: U.S. predicted number of households (2010 base=100)
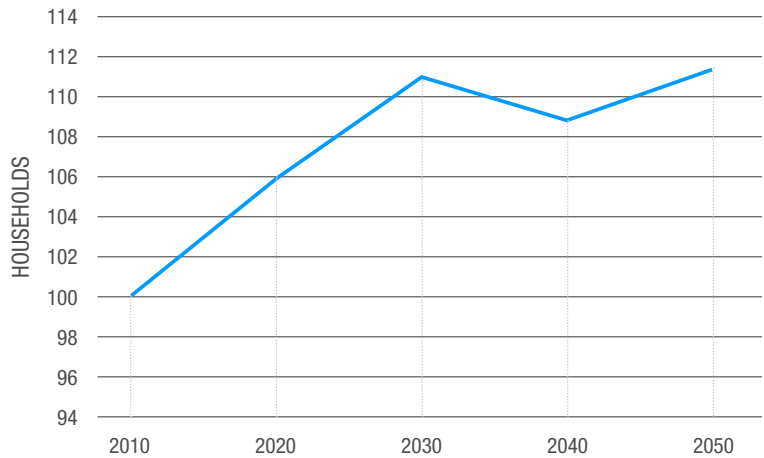
Although these estimates are for the U.S., and hence not easily extrapolated to the rest of the world, they may be useful in providing guidance to future net household formation. For Europe, North America, Japan, Korea, and other OECD countries that have already made the adjustment from a poor rural economy to an industrial or post-industrial urbanized economy, we may use the U.S. model as a baseline to forecast net new household formation. It could be argued that near term movements of populations from poorer rural areas of China to urban industrial cities obviates the usefulness of the any model based on U.S. data. Longer term, however, there is every reason to assume that the general conclusions will hold for China as well, once the urbanization process is completed.

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[10] We are aware of the shortcomings of using U.S. data to forecast household formation for other countries. Since we are interested in gross implications consider the results with a wide area of possible deviation.

Table 1: Household formation projections by country – 2050

DECADE	COUNTRY	PERCENTAGE CHANGE IN NUMBER OF HOUSEHOLDS
2010	China	-33.861%
2020		-12.869%
2030		-15.240%
2040		-4.294%
2010	Germany	-6.388%
2020		-7.569%
2030		-9.452%
2040		-3.254%
2010	Japan	-17.747%
2020		-12.428%
2030		-6.852%
2040		-6.685%
2010	Korea	-17.264%
2020		-17.710%
2030		-13.120%
2040		-6.632%
2010	Italy	-17.359%
2020		-4.913%
2030		-3.384%
2040		-5.316%
2010	U.S.	5.924%
2020		4.843%
2030		-1.972%
2040		2.359%

Table 1 presents the projections for Japan, Germany, France, Italy, Korea, and the U.S. Clearly these projections will not be correct. The input factors vary widely depending upon the assumptions in the U.N. forecasts and the errors can be quite large.[11] This aside, the implications for the direction of household formations are observable. In each of the above cases, it is forecasted that movement is towards household deformation, not net positive new formations, with, as expected, Japan leading the way. Percentage changes represent 10-year household formation.

Since China is the second largest economy and expected to become the world's largest by many, a similar analysis for the Chinese economy is made. In this case we assume that the rural to urban process is completed by 2040. As such, the forecasts for the periods 2010, 2020, and 2030 may not be good forecasters of overall housing demand. Still, the implications of this are startling. It may be that the housing boom will be over much sooner, suggesting a potential housing market collapse, given the projections of household deformation now occurring.[12]

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[11] The U.N. database for demographics is the source. Many variants exist for possible demographic movements. We have chosen to work with one that is moderate, since it neither assumes a steady state of birth and death rates nor does it assume a return to a more fertile birth trend. Needless to say, deviations in immigration from historical norm will impact the actual outcomes as well.

[12] An interesting aside is that many are now arguing that China has overbuilt already given the number of structures that are not occupied. If this argument is correct, then a great deal of assets now on bank balance sheets are actually worth much less than face value. This was pointed out by Christopher Rapcewicz to one of the authors as a potential issue that could plague the financial system of China.

Only the U.S. seems to avoid severe problems, with only one decade of suggested deformation. Moreover, the small size of this projected dip suggests that it is possible that the U.S. can avoid deformation completely. Clearly, however, to believe that the household formation impact on demand will resemble anything like that of the past 50 years would be inappropriate.

In contrast to the U.S. observe forecasts for Italy. Anecdotally, towns are already being emptied of people. As such, the forecast for 2020 does not seem out of touch with reality. We are already observing the phenomenon. And in the case of Japan, the size of the negative numbers are startling. These are percentage changes per decade. Projected population declines and the aging of the population are all consistent with today's observations. If these projections are close to reality, assuming a decline in households of 30 to 50% over the next 40 years is likely. If so, one can then extrapolate the implications for the excess supply of housing arising from this trend. For South Korea the situation is just as bad or worse. And, for Germany the trend is clearly similar.

Household formation in the wealthy countries, with the exception of the U.S., is clearly headed toward significant deformation. Household deformation is a new phenomenon for modern economies. Due to population declines during periods of famine and disease during earlier centuries we know that the implications for growth (stagnation) are many, including significant political upheavals. As such, it behooves us to understand some of the implications now, so that policy decisions will reflect these realities before significant decisions (errors) are made. Moreover, the implication for the banking and insurance industries are enormous given that housing is a crucial part of their business, either directly or indirectly through asset accumulation via the capital markets.

> "It is the demographic trap — forget the liquidity trap — that will negate historically observed positive aspects of demand management policy."

5. POLICY IMPLICATIONS OF HOUSEHOLD DEFORMATION

Most vulnerable to the implications of the aging of the populations is the Keynesian multiplier methodology engrained in most economic growth models. As such, standard pump-priming policies, shovel-ready stimulus may not work. It will not drive demand in the same manner as it did in the 60s or even later decades. And, with potential household deformation such policies may simply be distortionary, without any benefit.

Further, it may be difficult for export-led economic growth to work. Trade has always been a vehicle for greater economic well-being. It has been the source of much of the ending of poverty for many. Japan and Korea used it to develop, just as China has done so more recently. However, this tool will be under threat as a vehicle for growth if the wealthy nations are not growing households, demanding the types of goods that go with such growth.

Although policy may be the most important issue raised by household deformation, there are implications for the capital markets as well. As household deformation becomes evident, wealth captured in existing housing is reduced due to excess supply. As such, housing wealth in many countries may already be overestimated, raising issues for pension funds, banks, and insurance companies that depend upon MBS portfolios. Much as new solar technology may make oil and gas in the ground less valuable as some argue, banks and the capital markets may already be overestimating the value of housing held in their portfolios, just as in 2008 -09. Only this time the overhang may be unending or at least for the life of many securities now held by those firms. This creates a large systemic risk for the global financial system.

The world economies rebounded from the last crisis – it is argued by many though disputed by some – via government deficit (stimulus) policy. Moreover, this fiscal response (evidenced by government debt levels) was supported by zero interest rate policies and the socialization of many of the world's banking risks. If the next systemic financial crisis arrives during a period of extreme household deformation, these policies may not be sufficient or even useful. Indeed, if the capital value decline affecting the financial system is driven by household deformation, then fiscal stimulus policies will not likely have a positive impact, thereby leaving the financial system in a precarious position. Traditional models of behavior cannot be depended upon, implying traditional models cannot be depended upon. History should not be taken as a guide to the future.

Monetary policy predictability becomes more important; expansionary policy to stimulate demand may not work with lags as in the past. Indeed, if the policy works at all as intended, lag effects may be unpredictable, especially with a globally integrated economy. Unintended consequences may lead to political disquiet as wealth is transferred from savers to borrowers, without enhanced wealth creation for the middle and lower income earners (leading to a skewing of income distributions due to increased return on leveraged capital with low interest rates). At a very least, such policies will create distortions that are different from the ones that may have been created during the 30s or 50s with such policies.

What then can governments do? If they cannot tax and spend to create a multiplier effect; if central banks cannot push us out of the demographic trap is there any solution? If the benefits of export-led development models that helped Japan, Korea, and China to develop may not work in the future, is there anything left?

It is the demographic trap – forget the liquidity trap – that will negate historically observed positive aspects of demand management policies. There is little that central planners can do about it other than accept that their top-down stimulating policies will not work in time, that their forecasts are not likely to be anywhere close to correct, and that slower growth and low inflation are on the cards unless a new policy direction, not rehashed neo-Keynesian prescriptions, are found.

APPENDIX 1

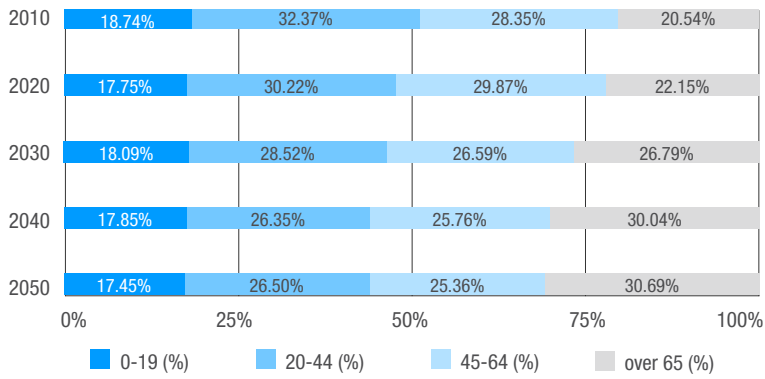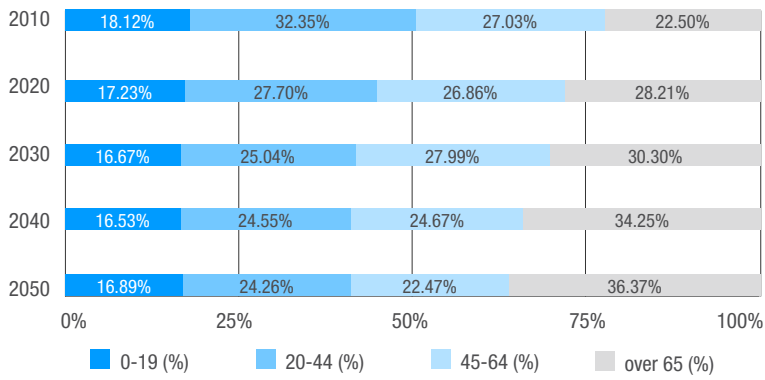**Figure A1:** Germany demographic changes (2010-2050)

Year	0-19 (%)	20-44 (%)	45-64 (%)	over 65 (%)
2010	18.74%	32.37%	28.35%	20.54%
2020	17.75%	30.22%	29.87%	22.15%
2030	18.09%	28.52%	26.59%	26.79%
2040	17.85%	26.35%	25.76%	30.04%
2050	17.45%	26.50%	25.36%	30.69%

Legend: ■ 0-19 (%) ■ 20-44 (%) ■ 45-64 (%) ■ over 65 (%)

Figure A2: Japanese demographic changes (2010-2050)

Year	0-19 (%)	20-44 (%)	45-64 (%)	over 65 (%)
2010	18.12%	32.35%	27.03%	22.50%
2020	17.23%	27.70%	26.86%	28.21%
2030	16.67%	25.04%	27.99%	30.30%
2040	16.53%	24.55%	24.67%	34.25%
2050	16.89%	24.26%	22.47%	36.37%

Legend: ■ 0-19 (%) ■ 20-44 (%) ■ 45-64 (%) ■ over 65 (%)

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