Big Data, Dwindling Participation

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How Big Data helps in understanding secular declines in U.S. prime age labor force participation

Languid youth, robot destroyers, foreign invaders and an epidemic sound like the lineup for Netflix's fall dramas primed for uploading and binge watching. However, these themes are part of a growing list of explanations for the remaining frictions in the labor market, that all else equal, would not be expected to persist in an environment where the unemployment rate is near a 15-year low of 4.4%. As a result, attention has shifted away from the gold standard of labor market indicators such as the unemployment rate to more nuanced measures of labor market soundness such as the employment-to-population and the participation rate.

Part of the drift in attention can be explained by the realization that secular trends, in the form of an aging population, were having a disproportionate impact on traditional measures, as the anomalous outflows of retirees led to spurious drops in the unemployment rate. Furthermore, the magnitude and duration of the financial crisis also generated a disproportionately larger increase in labor underutilization better explained by broader measures of unemployment and underemployment; this includes individuals that are discouraged and stopped looking for work or those employed part time for economic reasons. However, these largely cyclical measures have returned to levels that are consistent with a labor market that is at or near its steady state, shifting attention beyond the cyclical recovery to secular factors that could possibly explain the persistent weakness.

Figure 1. Labor Force Participation, %
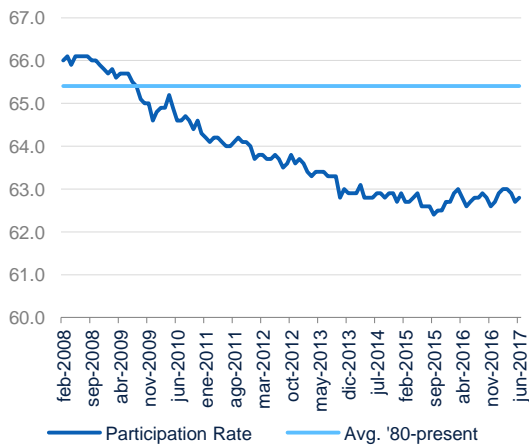
Source: BBVA Research, BLS & Haver Analytics

Figure 2. Employment to Population Ratio, %
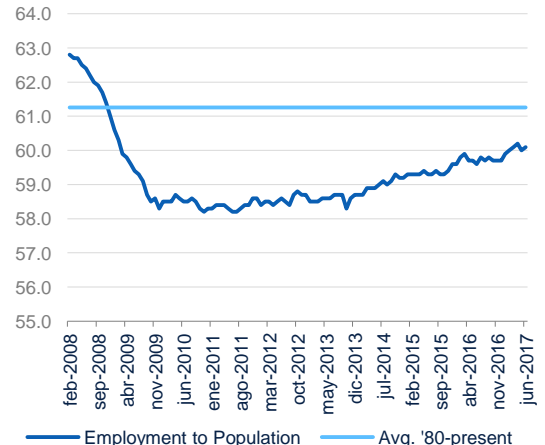
Source: BBVA Research, BLS & Haver Analytics

Using over 8 million annual survey responses in the Current Population Survey (CPS) between 1962 and 2016, we find that among other contributing factors, health outcomes are the most important determinant of prime age labor force participation (age 25 to 54 years old). With this finding, it is clear that a large part of the response to reversing the trend in prime age participation will require public policies that are focused on outcomes that balance the incentives between work and leisure, but without neglecting the impact that poor health can have on a variety of key economic factors such as human capital and participation.

For some experts, life-expectancy is the ultimate measure of well-being, and thus one of the top priorities of the government should be to increase the overall health of the population. While some segments of the population have high life expectancies, the gap between the healthiest and least healthy populations is larger than 20 years in some cases. In fact, the U.S. remains below most of its OECD peer group in terms of average life expectancy, and certain segments of the population like Black males have a life expectancy similar to low-income and underdeveloped countries like Bangladesh, Iran and North Korea. Meanwhile, mortality rates for White non-Hispanics in their midlife have increased since the turn of the century. According to official data, the top 9 causes of death in the U.S. are related to health: cancer, diabetes, drug overdose and alcoholism.

Figure 3. Prime Age Labor Force Participation, %
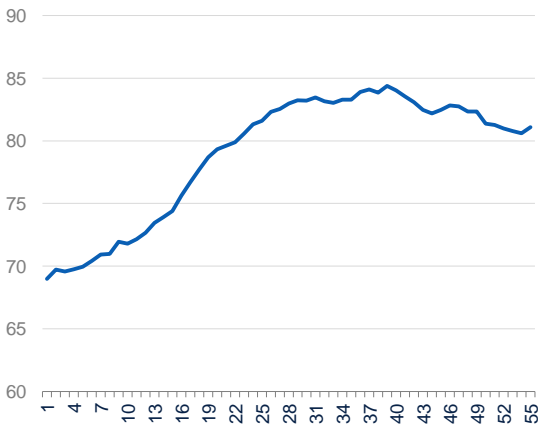
Source: BBVA Research, CPS & IPUMS

**Figure 4.** Change in PA Labor Force Participation, 2000-2016 %
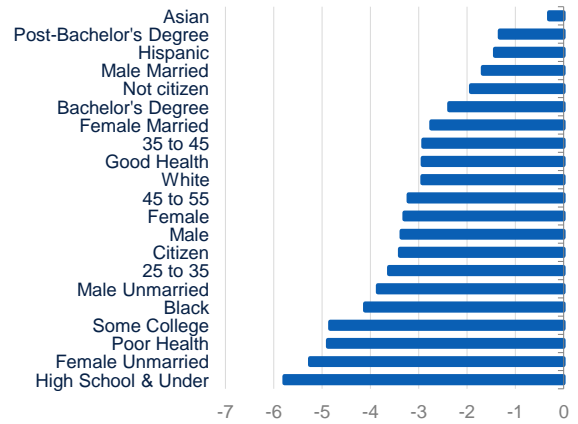
Source: BBVA Research, CPS & IPUMS

Focusing on prime age participation, which tends to be less vulnerable to fluctuations in the business cycle or aging, provides a better reflection of the structural health of the labor market. Since 2000, prime age participation has declined from a peak of 84.3% to 81.1% in 2016. Excluding married males, non-citizens, Hispanics and post-secondary degree holders, nearly all demographic categories have seen a substantial drop in participation. The most dramatic drop in participation occurred among individuals who do not have a high school diploma (-5.7%), are in poorer health (-4.8%), are Black or African American (-4.1%) or were unmarried (Females: -5.2%, Males: -3.9%). The fact that no category, not even highly skilled individuals increased, and that the decline predates the financial crisis suggests that cyclical factors and aging only partially explain the exodus from the labor force.

Beyond participation, there is also evidence that in addition to lower prime age participation there has also been a downward trend in average weekly hours worked, suggesting that the intensity of participation is also slowing. Excluding women, this relationship holds across demographic cohorts such as race and age. A declining number of hours worked could compound the lack of participation, creating additional headwinds for economic growth. In fact, since potential GDP growth could be decomposed into hours worked and labor productivity, a drop in labor force participation, all else equal, will result in lower potential GDP growth, which would translate into lower growth in real incomes, wealth creation and well-being.

Figure 5. Prime Age Male & Females Not in the Labor Force, Millions
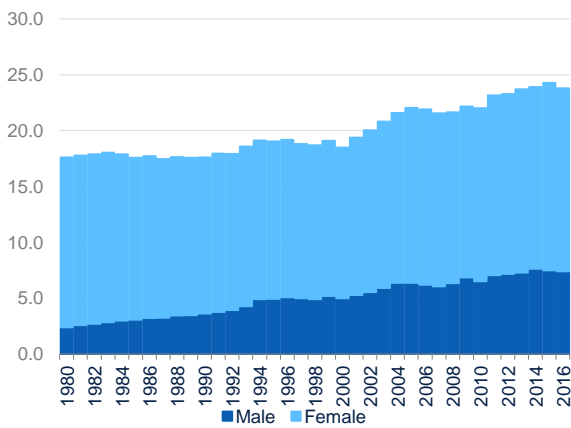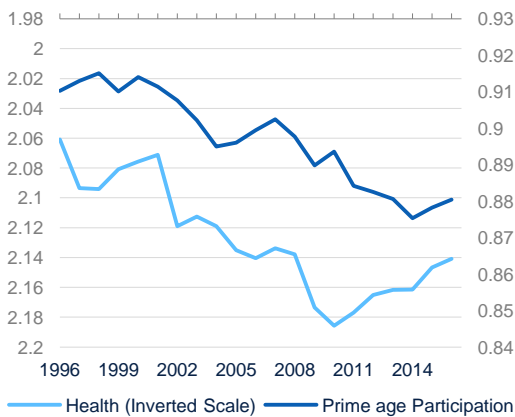

Source: BBVA Research, CPS & IPUMS

Figure 6. Prime Age Not in the Labor Force & Reporting Poor Health, Millions
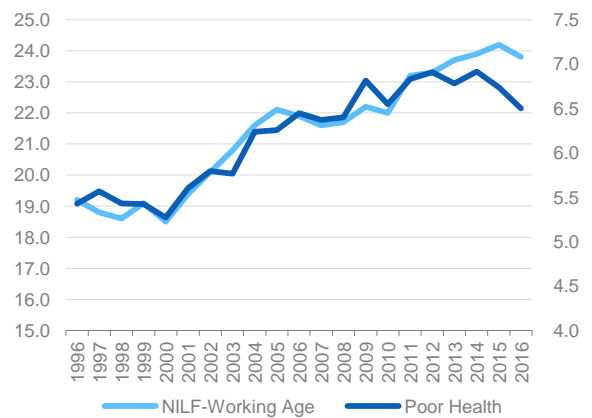
Source: BBVA Research, CPS & IPUMS

Figure 7. Men's Health and Prime Age Participation, %

Source: BBVA Research, CPS & IPUMS
* Health Response (1-excellent, 5-poor)

Figure 8. Prime Age Average Weekly Hours Worked
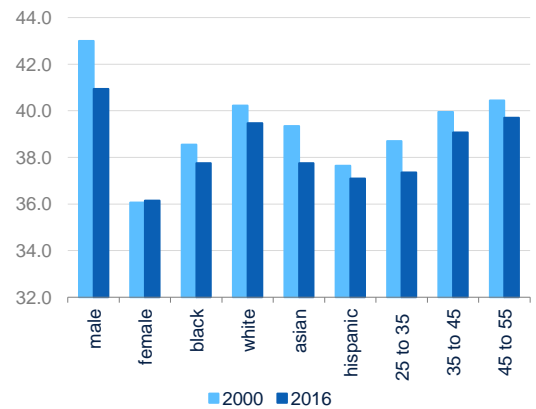
Source: BBVA Research, CPS & IPUMS

A significant number of hypotheses have been presented to explain the decline in participation. For males, competition from robotics and imports, drug abuse, high reserve wages, retrospective wait and gender norms/bias have been common theories put forth to explain lower participation. For example, with respect to robots Acemoglu and Restrepo

2017 find that for every additional robot per thousand workers, the employment to population ratio declines by 0.18-0.34 while wages drop by 0.25-0.5. With respect to drugs, there is new evidence (Case and Deaton 2017) of broad-based increases in morbidity and mortality which according to Krueger 2017 is closely associated with male labor force participation; nearly half of the working age men out of the labor force report taking pain killers, of which two-thirds report taking prescription pain-killers such as opioids. There is also evidence that the occupations in demand in the middle-to-high skilled service sector such as nursing and education are broadly unappealing to males as they represents segments of the labor market traditionally dominated by females. This aversion to "pink collar jobs" could be compounded by a reluctance to exit the labor force and seek a technical degree.

Figure 9. Prime Age Labor Force Participation, % and PP change since 2000

	High School & Under	Some College	Bachelor's Degree	Post-Secondary
Male	82.8(-12.2)	90.1(-5.0)	92.6(-2.6)	94.5(-1.3)
Female	62.6(-8.4)	80.0(-2.6)	80.9(-2.3)	87.0(-2.9)
Black	68.7(-6.8)	83.8(-5.3)	87.5(-4.3)	90.7(-4.8)
White	74.9(-6.5)	85.7(-2.8)	87.3(-2.3)	92.1(-1.9)
Asian	73.2(-5.7)	80.4(-3.6)	79.1(-5.0)	83.7(-3.8)
Hispanic	74.6(-3.1)	83.5(-3.6)	85.6(-2.4)	88.9(-6.0)
25 to 35	57.4(-14.4)	75.9(-10.0)	79.3(-6.0)	82.0(-9.0)
35 to 45	55.7(-15.1)	72.0(-10.0)	74.9(-8.1)	83.8(-6.9)
45 to 55	61.7(-5.8)	72.3(-3.7)	73.3(-2.5)	81.7(-6.0)
Good health	79.5(-5.3)	86.8(-2.5)	87.4(-2.5)	91.1(-2.3)
Poor health	39.7(-7.4)	56.3(-8.1)	65.0(-6.8)	73.7(-10.4)
Married	74.9(-5.2)	84.3(-2.8)	84.5(-3.2)	89.7(-2.7)
Unmarried	72.3(-8.1)	85.3(-6.2)	89.5(-3.3)	92.1(-3.0)

Source: BBVA Research, CPS & IPUMS

For Millennials and younger workers, arguments tend to focus on lack of motivation and skills. However, our generational cohort analysis showed that Millennials do trail their peers in categories such as income, asset ownership and unemployment but are more active in the labor market and have achieved higher education levels than their peers. Nonetheless, there is some experimental evidence showing that degrees from "for profit" colleges are associated with lower callback rates, suggesting that there is a growing gap between educational attainment and skills. In addition, there has been a hollowing out of the middle-skilled occupations. This leaves many recent college graduates— in the current cycle primarily Millennials— with skills that are insufficient for high skilled technical occupations but are superfluous for low-skilled service occupation. In fact, a survey from the National Federation of Independent Business reports that quality of labor is one of the main problems for small businesses.

Women's lack of participation, on the other hand, has been tied to work-life balance obstacles, inequalities and labor market bias among other factors. Surprisingly, unlike most developed economies, women's prime age labor force participation has declined in recent years. In addition, the biggest drop in prime-age female participation is among those who are unmarried suggesting that work-life balance may not fully explain this trend. However, for women it seems that

rising real wages still incentivize greater participation, meaning that unlike men, more women may be encouraged to rejoin the workforce if female real wages rise to levels that better reflect their skills and meet their reservation wage for work.

Prolonged labor market detachment and aggregate wages weigh on prime age participants at national level

To disentangle the factors driving the drop in prime age labor force participation we constructed a time-series using household level responses from the current population survey (CPS). The more than 8 million data points allow for the creation of unique prime-age participation datasets that includes explanatory factors such as wages, income from disability and unemployment insurance, taxes, duration of unemployment and self-reported health across race, gender, age and education. The household data set also allowed for the creation of a similar state-level panel dataset with aggregate and cohort-specific explanatory factors.

**Figure 10.** Prime Age Participation Elasticities Among Demographic Cohorts, response to one % change*
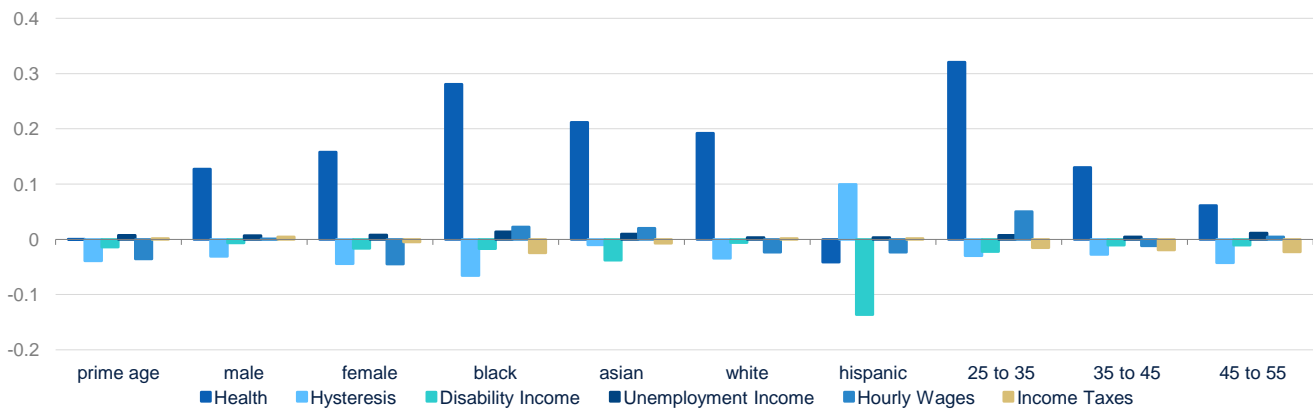
Source: BBVA Research, CPS & IPUMS
*See appendix for full regression results

At the national-level, among factors such as average hourly wages, morbidity, duration of unemployment, disability and unemployment income, and taxes we find that duration of unemployment and real hourly wages have had the largest impact on prime age participation. Erosion of skills, self-confidence and negative perceptions from employers are factors that underlie the challenges of long-term unemployment and the importance of remaining attached and engaged in the labor market. Moreover, the magnitude and severity of the crisis left many workers unemployed for nearly twice as long. In fact, based on our regression results reducing average duration of unemployment during the crisis by 1/3rd– this would imply reducing the average time unemployed per worker from 35 to 21 weeks– could have boosted the labor force participation rate by 1.0pp, increasing labor force entry by 1.2 million all else equal.

In terms of real wages there were two key results. One, the negative coefficient on real wages suggests that for every one percent increase in real hourly wages, prime age participation decreases by 0.4%. This implies that for prime age

participants the income effect is stronger than substitution effect, meaning that workers choose to take the marginal gains from higher incomes and spend them on leisure as opposed to working more, which would be expected when the cost of leisure rises. Second, the effect is only significant for males; for females, the effect is statistically insignificant whereas for males it is highly significant. Duration of unemployment is, however, a significant determinant of female participation, underlying the need for women to avoid being detached from the labor for extended periods of time. The dataset also confirms that attachment to the labor force can also take the form of part-time work, as women are nearly twice as likely to be working part-time as males.

Figure 11. Duration of Unemployment, # of weeks
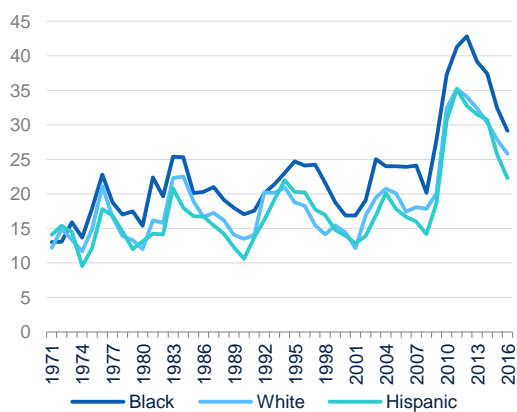
Source: BBVA Research, CPS & IPUMS

Figure 12. Prime age part time labor force, %
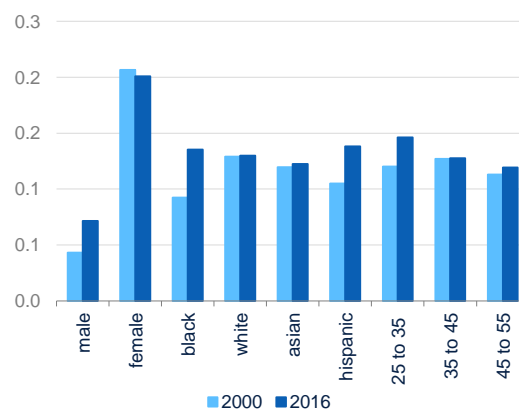
Source: BBVA Research, CPS & IPUMS

There were heterogeneous outcomes among race and age cohorts. For Whites and Hispanics, health and disability income were significant determinants of labor force participation whereas long-term unemployment was the only statistically significant explanatory factor for Black labor force participation, possibly underpinned by comparatively higher incarceration rates and greater labor market frictions. For Asians and young people (25 to 35 years old), none of the aforementioned factors were significant determinants of labor force participation.

For older prime age worker (35 to 45 years old), prolonged periods of inactivity in the labor force and taxes were strong determinants of labor force participation. Unlike the aggregate findings in which the income effect dominated relationship between wages and participation, for Hispanics, increases in real hourly wages were associated with higher labor force participation. Among other non-economic factors, the fact that Hispanics tend to have lower incomes is consistent with a backward bending labor supply curve, in which the marginal increase in wages for low income earners is associated with increased work rather than leisure.

Regional results point to unequivocal challenge to participation: labor force well-being

Data at the regional level confirms the negative trend in prime age participation, as all 50 states have experienced a decline in prime age labor force participation from their peaks. Nevertheless, the disparity among states was significant.

For example, prime age labor force participation in Wisconsin has only declined by 1.2pp (the lowest) whereas Alabama has seen its prime age participation rate drop by 10.8pp (the highest). Likewise, relative to the pre-crisis period (2005-2007) prime age participation has increased in states like Massachusetts, Wisconsin, Illinois, Missouri and Delaware. Massachusetts's health reform that was enacted in 2006 could help to explain part of the improvement in labor force participation, as this period was also associated with gains in reported health. Conversely, less generous family support and social insurance in the post-crisis period, which can improve incentives to work, led to improvements in participation in Mississippi, Missouri and Arkansas.

Figure 13. Change in Labor Force Participation Since peak, %
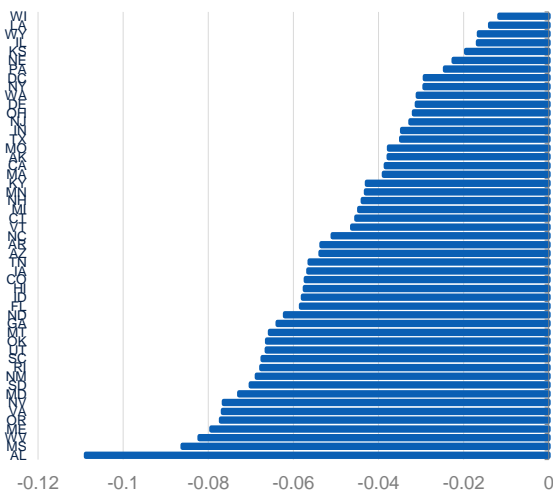
Source: BBVA Research, CPS & IPUMS

Figure 14. State-level Prime Age Participation and Health, %
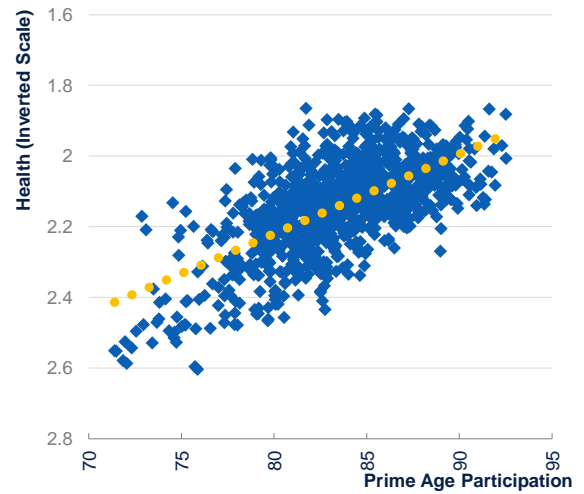
Source: BBVA Research, CPS & IPUMS
* Health Response (1-excellent, 5-poor)

To determine the relative importance and reduce, or even eliminate bias from omitted or unobserved factors we estimate a similar specification to the national level regression at the state-level, using a fixed effects model. Eliminating the impact from unobserved factors such as family dynamics and structure, exogenous policy changes, work ethic, ambition, implicit racial bias, among others, should lead more reliable estimates of the determinants of prime age labor force participation.

At the state-level, our findings are broadly consistent with national trends in prime age labor force participation, but with nontrivial change to the significance of key variables. For example, healthcare becomes highly significant in nearly all cases with a high elasticity, which is consistent with comparative statistics at the national and state-level. In fact, a one percent increase in health outcomes within a state is six times more impactful than reducing long-term unemployment, 12 times more impactful than increasing real wages and 5 times more impactful than reducing the per capita tax burden.

While the bang-for-the-buck is clearly tilted towards healthcare, it is important to highlight that after controlling for any omitted bias in the national-level estimates the importance of lower taxes increases. The negative relationship between taxes and prime age participation is also consistent with intuition. The negative relationship suggests that, at the margins, after controlling for unobserved factors, a ten percent decrease in per capita tax burdens increases prime age

participation by 0.2%. In other words, reducing household's tax burden to 22% rather than 25%, which it currently is, would boost participation by 0.2%.

Another major improvement from the national level estimate is the links between the explanatory factors and prime age participation among 25 to 35 year olds. The national level estimate found no statistically significant relationship between prime age labor force participation and the explanatory factors: health, duration of unemployment, unemployment and disability insurance, real hourly wages nor per capita taxes. This was a surprising result given its implications. If these are not relevant factors then it suggests that this group was not impacted by the economic cycle, policy responses, nor were they negatively effected by increasing morbidity and mortality of white males, which still make up a large share of the labor force.

Figure 15. State Fixed Effects Prime Age Participation Elasticities Among Demographic Cohorts, response to one % change*
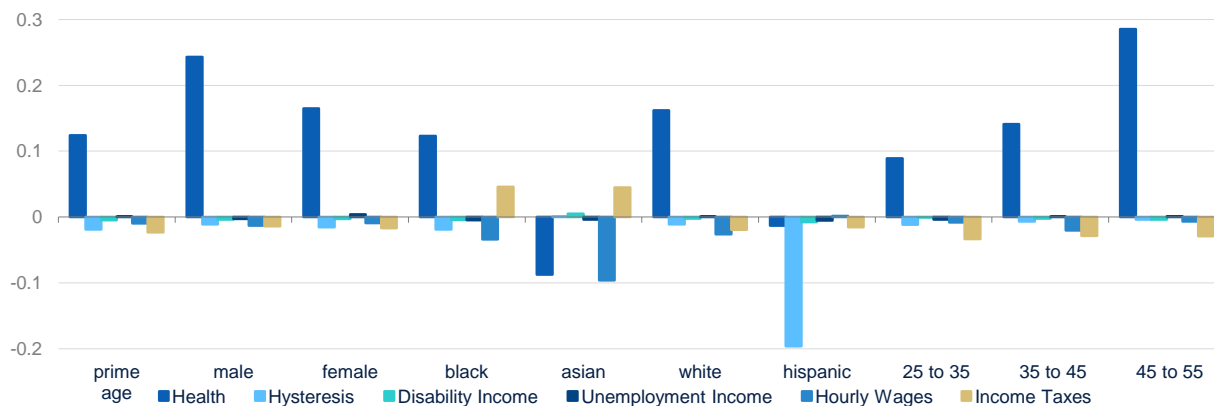
Source: BBVA Research, CPS & IPUMS
*See appendix for full regression results

However, after controlling for state fixed effects, unlike the national estimation, we found that health, duration of unemployment, unemployment insurance and taxes do explain the drop in young prime age participation. In addition, while the insignificance of wages may be surprising it is not inconsistent with theory. In some instance, we observed that changes in real wages were negatively associated participation given the dominance of income elasticity. However, for young people given their relatively lower individual and household incomes, and greater income variability it is not surprising that wages are not significant determinants of participation.

Also of note is the fact that, for Hispanics, the relationship between long-term unemployment and labor force participation is highly significant; moreover, it has the highest elasticity suggesting that any reduction in long-term unemployment for Hispanic would have a proportionally larger impact. For instance, unlike the remaining population, a one percent decrease in unemployment duration has an impact 15 times larger than any improvements in health outcomes. It is worth noting that both male and female Hispanics have lower age-adjusted death rates than other groups and thus, health conditions may be less relevant for these groups.

Implication of failing to address secular headwinds dire

Although prime age participation improved in 2016 for the first time since 2000, the magnitude of the drop since then and the secular forces working against greater participation suggests that there is pressing need to confront these issues with timely and effective policies. Stronger economic growth and more widespread gains will not be enough. In fact, from an accounting perspective, lower prime age labor force growth and less working hours in the absence of substantially higher growth in capital spending or meaningful productivity gains will imply lower potential growth for the U.S. This trend can be self-reinforcing as lower growth in the supply-side could also depress demand-side conditions in the economy potentially pushing the economy closer to conditions characterized by secular stagnation similar to the Japanese experience.

However, our results seem to suggest there is a clear course of action to boost participation in the labor force; focus on outcomes-based improvements in healthcare as opposed to exhaustive efforts to reduce costs. Any policy action will also have to balance the incentives or disincentives to work.

In addition, evidence from over one million household survey responses suggests that actual or perceived health have improved since the Affordable Care Act (ACA). In addition, the link between healthcare coverage and labor force participation may have been altered by the ACA, as health coverage is now no longer tied to binary outcomes of poverty guidelines or employment (employer sponsored coverage). Instead, healthcare is subsidized and offered at varying degrees, potentially leading to fewer distortions in the incentives to work, remain out of the labor force or not changes jobs due to fear of losing health coverage.

The case to take action to improve healthcare conditions becomes even more obvious when taking into account that spending in the U.S. is the highest in the developed world. Thus, improving healthcare and reducing total spending is an achievable outcome. This would not only increase participation, life expectancy and well-being but it could also reduce the tax burden. The question then is why policymakers have failed to take swift and decisive action when it is so obvious that the benefits will be so wide and profound?

While there are obvious opportunities to improve the existing healthcare plan, lowering coverage or implementing policies that are less effective would be counterproductive, implying lower potential growth, a smaller labor force and diminishing opportunities for individuals at the margin. As such, the focus needs to shift away from the short-term fixes to long-term solutions that can boost labor market opportunities and counteract secular headwinds. Failing to do so will inevitably lead to a scenario which requires confronting these challenges at higher economic and social costs.

Appendix- Regression Tables

Figure A-1. Linear Regression Results for Prime Age Labor Force Participation

VARIABLES	(1) prime age	(2) male	(3) female	(4) black	(5) asian	(6) white	(7) hispanic	(8) 25 to 35	(9) 35 to 45	(10) 45 to 55
Health	-0.00054	-0.127	-0.158	-0.281	-0.212	-0.192*	0.0412**	-0.321	-0.130	-0.0614
	(0.135)	(0.108)	(0.317)	(0.273)	(0.543)	(0.103)	(0.0146)	(0.375)	(0.132)	(0.151)
Duration of Unemployment	-0.039***	-0.030***	-0.0440**	-0.065***	-0.00981	-0.034***	0.0992	-0.0296	-0.0271**	-0.042***
	(0.0101)	(0.0067)	(0.0161)	(0.0167)	(0.0376)	(0.0059)	(0.136)	(0.0222)	(0.0107)	(0.0103)
Disability Income	-0.0143	-0.00366	-0.0149	-0.00149	-0.00840	-0.0153**	-0.056***	-0.00335	-0.00516	-0.00018
	(0.0090)	(0.0063)	(0.0147)	(0.0117)	(0.0107)	(0.0067)	(0.0122)	(0.0061)	(0.0085)	(0.0050)
Unemployment Income	0.00755	0.00607	0.0128**	0.0106	0.00710	0.00699*	-0.00158	0.00405	0.00799	0.0114**
	(0.0064)	(0.0042)	(0.0046)	(0.0075)	(0.0140)	(0.0036)	(0.0069)	(0.0089)	(0.0069)	(0.0042)
Real Hourly Wages	-0.0352*	-0.078***	-0.0448	-0.0564	0.0577	-0.0277	0.017***	-0.0143	-0.0288	-0.00471
	(0.0188)	(0.0211)	(0.0719)	(0.0927)	(0.0939)	(0.0226)	(0.0057)	(0.0850)	(0.0279)	(0.0365)
Taxes per Capita	0.00156	-0.0148	0.0102	-0.00463	-0.0560	0.00769	-0.00439	-0.0125	-0.0121	-0.0220*
	(0.0133)	(0.0154)	(0.0201)	(0.0431)	(0.0568)	(0.0147)	(0.0367)	(0.0295)	(0.0104)	(0.0123)
Constant	0.178	0.203	0.193	0.306	-0.538	0.256	0.112	0.267	0.188**	0.150
	(0.220)	(0.157)	(0.446)	(0.420)	(0.651)	(0.230)	(0.221)	(0.154)	(0.0811)	(0.125)
R-squared	0.957	0.944	0.892	0.728	0.326	0.947	0.655	0.833	0.925	0.929

Source: BBVA Research, CPS & IPUMS

Figure A-2. State Fixed Effects Regression Results for Prime Age Labor Force Participation

VARIABLES	(1) prime age	(2) male	(3) female	(4) black	(5) asian	(6) white	(7) hispanic	(8) 25 to 35	(9) 35 to 45	(10) 45 to 55
Health	-0.124***	-0.243***	-0.165***	-0.123***	0.0872	-0.162***	0.0130	-0.089***	-0.141***	-0.285***
	(0.0219)	(0.0202)	(0.0319)	(0.0435)	(0.116)	(0.0239)	(0.0103)	(0.0284)	(0.0236)	(0.0259)
Duration of Unemployment	-0.018***	-0.011***	-0.015***	-0.018***	0.00063	-0.011***	-0.196***	-0.011***	-0.006***	-0.0036*
	(0.0025)	(0.0018)	(0.0023)	(0.0044)	(0.0105)	(0.0020)	(0.0380)	(0.0026)	(0.0020)	(0.0019)
Disability Income	-0.004***	-0.003***	-0.002***	-0.004***	0.00524	-0.002***	-0.00762	-0.00012	-0.002***	-0.003***
	(0.0012)	(0.0006)	(0.0008)	(0.0014)	(0.0044)	(0.0007)	(0.0047)	(0.0007)	(0.0006)	(0.0009)
Unemployment Income	0.00078	-0.002**	0.004***	-0.0047*	-0.00391	0.00065	-0.005***	-0.003**	0.00063	0.00122
	(0.0013)	(0.0011)	(0.0014)	(0.0028)	(0.0063)	(0.0012)	(0.0018)	(0.0015)	(0.0013)	(0.0013)
Real Hourly Wages	-0.0097*	-0.0130*	-0.00881	-0.0339*	-0.096**	-0.026***	0.00188	-0.00812	-0.0204**	-0.00667
	(0.0050)	(0.0069)	(0.0092)	(0.0192)	(0.0472)	(0.0080)	(0.0030)	(0.0105)	(0.0079)	(0.0082)
Taxes per Capita	-0.022***	-0.014***	-0.017***	0.045***	0.0447	-0.019***	-0.0153	-0.033***	-0.028***	-0.029***
	(0.0035)	(0.0045)	(0.0031)	(0.0113)	(0.0301)	(0.0036)	(0.0146)	(0.0054)	(0.0043)	(0.0044)
Constant	0.288***	0.134***	-0.138***	0.209***	0.122	-0.00223	0.0589	0.267***	0.295***	0.365***
	(0.0351)	(0.0331)	(0.0453)	(0.0790)	(0.208)	(0.0409)	(0.0729)	(0.0452)	(0.0367)	(0.0414)
Observations	1,050	1,007	998	552	85	1,026	424	767	944	1,002
R-squared	0.396	0.329	0.211	0.114	0.101	0.293	0.106	0.228	0.211	0.245

Source: BBVA Research, CPS & IPUMS

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