Effect of technology push in indonesia economics essay

Abstract: Macroeconomics indicators used to reflect economics condition of a country. Gross Domestic Product (GDP) as well as Inflation Rate and Unemployment Rate are key information for government to establish economics policy. Indonesia as developing country has the potential of natural resources that can support the country's economy, meanwhile, capital, labor and technology remain take an important influence. The aim of this paper is to analyze each of Macroeconomics Indicators and their interdependencies and further effect of technology push to economic well being. The result shown there are no interdependencies of Macroeconomics Indicators and

BACKGROUND AND RESEARCH QUESTION

Indonesia as a developing country has population of more than 237 million people spread across the country which covering area of approximately 1. 9 million square miles. Indonesia has a huge potential of natural resources, due its position in tropical area between two continents and two oceans, consisting 17. 508 islands and large ocean territory that stores biological wealth. Largest potential of natural resources that support state's economy are obtain from crude oil, natural gas, tin, copper and gold (Indonesia, 2010).

Even though Indonesia has big potential natural resources, unemployment remain became a big issue. Together with Gross Domestic Product (GP) and inflation rate, unemployment rate are government priority to keep balance. There are two-research question that want to discuss. Firstly, analyze macroeconomics indicators in Indonesia and interdependencies relationship between each indicator and find out parameters that affect economics

condition. Secondly, review the effect of technology push against unemployment.

Initial hypothesis are 1.) Economics growth that reflect from GDP might have positive influence to unemployment rate because GDP show economics well-being and if Indonesia has high level of GDP, it suppose to followed by low level unemployment. 2.) Inflation rate represent changes in price level, which means, if inflation rate increase (price level increase), it would decrease purchasing power of consumer and producer. At producer point of view, it would increase variable cost and to keep profit consequently, labor might reduce and the effect is unemployment increase. 3.) Technology push would increase productivity and efficiency, however, the side effect is labors minimized and lead to unemployment. Technology push, if applied in the right place and considering social effect, it would lead productivity increasing meanwhile unemployment growth keep avoid.

LITERATURE REVIEW

Some literatures explain concept of unemployment in term of economic aspect. Unemployment is one of the indicators of a country's economic conditions, in addition to economic growth through Gross Domestic Product (GDP) and Inflation rate. Unemployment, economic growth and inflation rate is seen to have an interdependent relationship. Previously, the following will clarify this economic parameter, both definitions and related economic theories.

Gross Domestic Product (GDP)

In his book " Principles of Economics", Mankiw (2008) simply defines Gross Domestic Product (GDP) as total income of nation. Furthermore, GDP reflect the market value of all both product and service which accepted by customer during the interval in certain period. To describe society's economic well-being, GDP measure not only total revenue of every part in economic system, but also all expenditure of goods and services. Economic theory state real GDP also reflects from aggregate supply curve.

Aggregate supply curve show total quantity of goods and services that are producers convey to customers (Mankiw, 2008). There are two different conditions of aggregate supply curve extent. Firstly, in the short run, aggregate supply curve slopes upward reflect positive relationship, means increasing of price level tends to increase quantity of goods or services. On the other hand, in the long run, aggregate supply curve turn to vertical, when price level does not affect quantity output. However, labor, capital and natural resources as input and technology used in advance gives effect to quantity output. In long run, aggregate supply meets its natural rate of output that is reflects GDP.

Kitov (2006) found that GDP formulated as total of personal income in a country who already have ability to produce goods or services. Thus, GDP is relating to sum of all income that received from working age population. Thereof, Personal Income Distribution (PID) from labor force is representing GDP of nation. Meanwhile, Levine (2010) analyze GDP have relationship with productivity and labor supply which show growth rate when the economic

system are fully employed. In addition, GDP depend on how many labor available and how productive the labor to produce goods or services.

Inflation Rate

There are many descriptions about inflation. Inflation simply defines as situation where price level is rising (Mankiw, 2008). Thus, high value of inflation leads to various cost to society as effect, hence, policy maker goal are to keep inflation value at low rate. On the other research, Amir (2003) emphasize that increasing of price level occur continuously, otherwise inflation do not exist. Furthermore, inflation classified based on cause factor i. e. demand-pull inflation, cost-push inflation and imported inflation. Demand-pull inflation occurs when aggregate demand raise significantly whereas aggregate supply stay constant. Therefore, demand is larger than supply that pushes price level higher. Cost-push inflation is situation when production cost increase sharply and encourage producer to reduce supply, which is lead to price increasing. Whereas imported inflation take place if increasing in price level as impact of price of goods are also increase at place origin (Amir, 2003).

Unemployment

Unemployment is regular issue of every country at short run of economics system (Amir, 2003). Both developed and developing countries are experiences the same problem, the differences be placed in level of natural rate of unemployment. Mankiw (2008) describe natural rate of unemployment as economics normally experience, however, this condition are still not desirable and remain in the constant value of any country.

Natural rate of unemployment reflect that in the long run, unemployment

remain exist. Definition of unemployment itself found many points of view. Unemployment straightly define as person who have ability and willingness to work but do not have opportunity (Sharplin and Marby, 1986). Unemployment occurs at imbalance condition between increasing in new labor force and jobs opportunity (Amir, 2003). In addition, Levine (2010) states if there is mismatch linking of skill that require for new job and skill of job seeker, even to fulfills jobs available would be a problem.

Coherence of GDP, Inflation and Unemployment

Macroeconomics put GDP, inflation and unemployment as prior to gives clues about economics well-being, and tools for policy maker to control economics activity to keep balance. This macroeconomics parameter have correlation one to another or as a whole measurement system.

From recent review about GDP, Long Run Aggregate Supply (LRAS) might shift due to particular conditions that are changes in labor, capital, natural resources and technology as its factor. Due to aggregate supply shift, aggregate demand also shifts as effect of Central Bank increase money supply to comply rising in aggregate supply. Shifting of LRAS might cause changes in inflation and unemployment. Both inflation and unemployment are two indicators that policy maker would like to pressed at minimum level. Figure 1 illustrates this macroeconomics phenomenon. As result of shifting in new equilibrium point, new price level occurs. For example, if there is significant technological improvement that shifts LRAS to the right, create new quantity of output. New quantity of output represents improvement in GDP value. Theoretically, increasing in output suppose to followed by

increasing labor used. In fact, this situation does not exist in the short run, even in long run. The new price level is higher which called inflation.

Mankiw (2008) explained that in the short run, tradeoff between inflation and unemployment occurs. Phillips Curve define phenomena when price level changes. Domino effect happen when policy maker change on of variable that determine price. Blanchflower (2007) on his research found that unemployment depressed economic well being more than inflation due to effect of unemployment more costly than inflation.

Technology versus Unemployment Rate

Sharplin and Marby (1986) define technology advancement as not only replacement by machines, but even simple, a better, faster and more efficient way of knowledge. Furthermore, unemployment takes place if technology advancement meets lack of competition in labor and product market. Avoid the application of advance while population increase and necessities of live rising would only degrade standard of living.

In his article, Blum (1970) states there only temporary effect of labor displacement with machine (technology). Tend to replace man power with machine to increase productivity is inevitable. Furthermore, effects of this replacement are temporary because when machine replace labor, it would follow by job replacement. Moreover, machine remain need labor to make it work and create new job, even though with higher requirement. Therefore, unemployment would not increase if labor attempt to adjust labor requirements with the new specification. In fact, it would enhance benefit to society (Blum, 1970).

Blum (1970) defines some method to avoid or minimize unemployment growth when advance technology applied. Programs prevent job loss, namely 1.) Advance notice and consultation, 2.) Attrition, and 3.) Work sharing might helpful to minimize effect even when technology not applied yet. Comprehensively, Blum (1970) also enlighten several program to re-employment, i. e. 1.) Advance Notice of Dismissal, 2.) Employment Exchanges, Placement Services and Special Counseling, 3.) Program for Training and Retraining and 4.) Mobility Program.

MACROECONOMICS INDICATORS IN INDONESIA

Describing relationship between economic growth, inflation rate and unemployment rate in Indonesia might be different with developed countries such as America and European countries. Economics policies, system and issues of developing country are depending on government point of view. Demographic, geographic, politics and culture might influence economics aspect in Indonesia.

Economic Growth

Indonesia's economic growth during the last two decades shows fluctuations. International Monetary Fund (IMF)[1]show data of Indonesia monetary parameter starting form 1980. In the early decades (1985 – 1995), fluctuations of Indonesia's GDP present positive trend with a significant increase of 2. 44% (in 1985) to 8. 22% (in 1995). However, after monetary crisis in 1998, trend of GDP growth experienced not significant growth even relatively decline. In times of crisis in 1998, Indonesia's GDP is located on -13. 13%. The main cause of the economic crisis is the weakening of Rupiah (Indonesian currency) against U. S. Dollar.

Many industrial sectors support Indonesia's GDP. Data from Central Board of Statistics[2]represent nine major industrial sectors that affect significantly to Indonesia's GDP (shown at table 2). The prior industry is Manufacturing Industry that is contributing 26. 38% from total GDP (in 2009). Agriculture, Livestock, Forestry and Fishery is the second largest contributor to 15. 29%. Trade, Hotels and Restaurants sectors provides 13. 37% of GDP portion. Mining and quarrying as substantial sector contribute 10. 54% to GDP. Nearly equal, other services (Administration, Government Service, Social Service and Tourism) at 10. 22% contribute to GDP. The others industrial sector provide less than 10%, however, in total remain important for GDP growth.

Inflation Rate

Bank Indonesia (Indonesian Bank, 2010) states inflation rate measured from Customer Price Index (CPI) and classified from seven spending based on the Classification of individual consumption by purpose (COICOP)[3]. Based on Nation Law, Bank Indonesia has a role to achieve and maintain rupiah exchange rate. Stability of exchange rate consists of two aspects, firstly, stability currency for goods and services that reflect growth rate inflation and on the other hand, stability against currency from other countries that reflect rupiah development against other countries currency.

IMF data show inflation fluctuation since 1985 and even more volatile in the last decade. Economic crisis in 1998 give great effect to economic in Indonesia. Keeping inflation stability became an issue and rupiah exchanges rate cannot repaired to condition before crisis. Before crisis, inflation rate (show at table 1) fluctuated from 4. 73% (in 1895) until highest point 9. 69% (in 1993). Indonesia experience extremely high inflation during economic

crisis, achieves 58. 02%, and affects all industrial sectors. In 1999, Indonesian Government attempted economic recovery and succeeds hold down inflation at 20. 75%. Since crisis period, inflation becomes volatile at lowest point 3. 77% (in 2000) and highest point 13. 10% (in 2006). Generally, inflation rate tends to increase in the past two decades and reflect high inflation level[4].

Unemployment Rate

Unemployment in Indonesia (Crayonpedia, 2009) classified based on characteristic into three categories: 1.) Open unemployment, 2.) Half unemployed[5]and 3.) Disguised unemployment[6]. These categories used to construct of unemployment mapping, which made by Central Board of Statistic to represent condition of macroeconomics in Indonesia for past 5 years. Open unemployment is most popular to describe unemployment condition. Open unemployment denote a group or population of labor force who does not have job due to lack of jobs available, people do not have motivation to working and discrepancy of job available with educational background. International Monetary Fund (2010) provides broader data of unemployment rate in Indonesia based on nation definition. Table 1. Figure unemployment fluctuation during 1984 – 2009, with lowest value is 1. 5 % (in 1984) and highest value is 11. 24% (in 2005). Unemployment trend from 1984 seen rising until 2005, furthermore decline until 2009. According to statement Menteri Tenaga Kerja dan Transmigrasi Republik Indonesia (Ministry of Manpower and Transmigration Republic of Indonesia, 2008) declare that natural rate of unemployment in Indonesia are about 4% – 6%.

Jobs classification comply with Central Board of Statistics data distinguished by nine industrial sectors, which shown at table 3. Agriculture, Livestock, Forestry & Fishing take the first place, which absorbs labor until 41. 18% from total jobs fields. Data shows majority of Indonesian are work relying on natural resources. Meanwhile, the other job fields that absorb substantial labor are job fields with low level of technology and education background, in contrary, job field with medium and high level of technology absorb less than 6% from labor supply.

GDP, INFLATION AND UNEMPLOYMENT CORRELATION

Unemployment defines as effect of economic growth condition and tradeoff effect of inflation rate. Phillips curve states inflation rate and unemployment rate are inversely proportional. For example, when inflation rate experiences increasing trend, as the effect, unemployment rate tends to decrease. In Indonesia, from data previously described, inflation rate tends to increase. Meanwhile unemployment rate tends to similar trends but less volatile than inflation rate. Figure 2 illustrate trend comparison between inflation rate and unemployment rate with ignoring outlier data (point at economics crisis). The line pattern not clearly shown causal effect of inflation rate to unemployment rate, and vice versa. Phillips curve of inflation rate (Y) and unemployment rate (X) shown at figure 3. Scatter plot represent volatile correlation and hard to evaluate causal relationship, whether positively or negatively relation.

Statistical test both Regression analysis and Correlation (Pearson) are choose to prove interdependencies. Unemployment set as dependent

variable that considered as final effect to society, and inflation as Independent variable as economics effect. Regression analysis result present at table 4, indicate there is no sufficient statistical evidence to support inflation rate affecting unemployment rate. Interpreting this result, even though there is show positively relationship (0. 40), in statistic point of view, there is no linear relationship. Furthermore, Correlation (Pearson) test give result weak interdependencies relationship (P-value > 0. 05).

Economics growth that reflect from GDP also considered determine unemployment rate. The same tools used to prove influence of GDP to unemployment. Scatter plot diagram (as shown at figure 4) between GDP (Y) and unemployment rate (X) illustrate volatile trend and unstable value, especially since 1995. This plot could not show linear pattern or relationship between GDP and unemployment rate.

For more evidence, statistical test also conduct to GDP and unemployment data. Regression analysis result indicates negative relationship (-0. 405) between GDP as independent variable and unemployment rate as dependent variable. However, there is very weak statistical evidence inferring this relationship. Furthermore, correlation (Pearson) test also revealed same result that is lack of evidence to support relationship between GDP and unemployment rate.

From both macroeconomics indicators analyses, scatter plot diagram and statistics test show weak correlation interdependencies between inflation rate and unemployment rate as well as relationship between GDP and unemployment rate. Unemployment rate not only (small effect) determines

by price level changes and economic well being, but also the other aspects such as low education level, culture and imbalance economics policies. Absence in linkage between macroeconomics indicators might reflect there is imbalance economics situation. Even though Indonesia store huge amount of natural resources, macroeconomics indicators showing equity principle not apply. For example, developed countries apply unemployment insurance to keep society at equity (Mankiw, 2008).

TECHNOLOGY

Indonesia has concern with unemployment issue and applying advanced technology might take complex consideration. Trend of unemployment relatively stable during past 10 years, and tends to decrease. Data shows (see table 8) that the largest part of unemployment in Indonesia was not / never school. If work force defines for 15 years old person, then minimum education level completed is junior high school. In fact, 50. 49% unemployment does not meet this requirement. Lack of educational background lead to weak compete ability to with another.

From recent research, know that technology push not necessarily rise up unemployment. Capability to face changes and adequacy to compete are best way to receive advance technology. Moreover, if technology applied for proper purposes, it would lead to improve economic well being and living standard of society. In Indonesia, as shown at table 2, Manufacturing Industry is the strategic sector to increase GDP and the benefit is, Manufacturing Industry sensitive to technological changes. Furthermore, Manufacturing Industry only employ 12. 07% employee from total employment. Thus, Manufacturing Industry is representative sector to drive

by advance technology. On the other hand, Agriculture, Livestock, Forestry and Fishing are responsive to technological changes. With largest proportion of employment absorption, this sector might cause significant effect to unemployment rate. Furthermore, Agriculture, Livestock, Forestry and Fishing relatively require low skill level, which dominated by unemployment. Technological push on this sector risky because recent employee might not prepared to face new requirement.

CONCLUSION

Macroeconomics indicators such as GDP, Inflation Rate and Unemployment Rate take important position to inform recent economic situation of a country. This paper show result that Indonesia has fluctuated economics condition since past of two decades (1985-2009). As individually, GDP indicate downward trend, Inflation Rate indicates upward trend and Unemployment Rate indicates upward trend. Generally, GDP trend and Unemployment Rate trend illustrate opposite effect. Meanwhile, Phillips curve principle not applicable, due to Inflation Rate has a same pattern with Unemployment Rate (Suppose to have the opposite effect). Statistical Test gives no evidence interdependencies between GDP, Inflation Rate and Unemployment Rate exist.

Technology push are prospective to apply in Indonesia, with remain considering the effect to unemployment and furthermore to society. This paper find out that Manufacturing Industry are potentially to drive by advance technology, whereas Agriculture, Livestock, Forestry and Fishing sector are not favorable as object to implement advance technology.

REFERENCES

Amir, A. 2003. Pengaruh Inflasi dan Pertumbuhan Ekonomi Terhadap Pengangguran di Indonesia, Journal [online] Available at:< http://www. pdf-finder. com/Pengaruh-Inflasi-dan-Pertumbuhan-Ekonomi-Terhadap-Pengangguran-di-.... html> [Accessed 31 December 2010]

Bank Indonesia, 2010. Pengenalan Inflasi, [online] Available at: [Accessed 2 January 2011]

Blanchflower, G. D., 2007. Is Unemployment More Costly Than Inflation?, Working Paper, No. 13505, National Bureau of Economics Research. [online] Available at:< http://www. dartmouth. edu/~blnchflr/papers/w13505. pdf> [Accessed 31 December 2010]

Blum, A. A., 1970. Technology and Unemployment : A comparative Study, Article, Industrial Relations, vol. 25, n3, 1970, p. 485-509. [online] Available at:< http://www. erudit. org/ revue/ri/1970/v25/n3/028151ar. pdf [Accessed 1 January 2011]

Crayonpedia, 2009. Angkatan Kerja Dan Tenaga Kerja Sebagai Sumber Daya Dalam Kegiatan Ekonomi, Article [online] Available at:< http://www. crayonpedia. org/mw/ANGKATAN _KERJA_DAN_TENAGA_KERJA_SEBAGAI_SUMBER_ DAYA_DALAM_KEGIATAN_EKONOMI_8. 2_SANUSI_FATTAH> [Accessed 1 January 2011]

Indonesia, 2010. About Indonesia, [online] available at: [Accessed 30 December 2010]

International Monetary Fund, 2010. World Economic Outlook Database, October 2010, [online] Available at:< http://www. imf. org/external/pubs/ft/weo/2010/02/weodata/weorept. aspx? pr. x= 74 &pr. y= 9&sy= 2008&ey= 2015&scsm= 1&ssd= 1&sort= country&ds=.&br= 1&c= 536&s= NGDP_RPCH, PCPIPCH, LUR&grp= 0&a=> [Accessed 2 January 2011]

Kitov, O. I., 2006. GDP growth rate and population, Working Paper, ECINEQ WP 2006 – 42, ECINEQ, Society for the Study of Economic Inequality. [online] Available at :< http://www. ecineq. org/milano/WP/ECINEQ2006-42. pdf> [Accessed 30 December 2010]

Levine, L., 2010. Unemployment and Economic Recovery, CSR Report for Congres, No. R40925, Congressional Research Service. [online] Available at:< http://www. fas. org/sgp/crs/misc/ R40925. pdf> [Accessed 30 December 2010]

Mabry, R. H. and Sharplin A. D., 1986. Does More Technology Create Unemployment?, Policy Analysis, no. 68, CATO Institute. [online] Available at:< http://www. cato. org/pub_display. php? pub_id= 934> [Accessed 1 January 2011]

Mankiw, N. G., 2008. Principles of Economics, 5th Ed., South-Western, Cengage Learning, Mason, Ohio.

Suparno, E. 2008. Kebijakan dan Strategi Penempatan Tenaga Kerja Indonesia di Luar Negeri, Article, Sekretariat Negara Republik Indonesia. [online] Available at: [Accessed 2 January 2011]

APPENDIX 1

Table 1. Indonesia Macroeconomics Indicators

Subject Descriptor

GDP

(Real Rates)

Inflation (CPI)

Unemployment rate

Units

Percent change

Percent change

Percent of total labor force

1980

9. 88

18. 02

n/a

1981

7. 60

12. 24

n/a

1982

2. 25

9. 48

n/a

1983

4. 19

-4. 11

n/a

1984

6. 98

-14. 17

1. 52

1985

2. 46

4. 73

2. 14

1986

5. 88

5. 83

2. 64

1987

4. 93

9. 27

2. 55

1988

5. 78

8. 04

2. 80

1989

7. 46

6. 42

2. 80

1990

7. 24

7. 84

2. 40

1991

6. 95

9. 37

2. 60

1992

6. 46

7. 51

2. 80

1993

6. 82

9. 69

2. 80

1994

7. 54

8. 52

4. 42

1995

8. 22

9. 43

8. 95

1996

7. 82

7. 00

4. 88

1997

4. 70

6. 19

4. 69

1998

-13. 13

58. 02

5. 39

1999

0. 79

20. 75

6. 33

2000

5. 35

3. 77

6. 08

2001

3. 64

11. 50

8. 10

2002

4. 50

11. 80

9. 10

2003

4. 78

6. 77

9. 50

2004

5. 03

6. 06

9. 86

2005

5. 69

10. 46

11. 24

2006

5. 50

13. 10

10. 28

2007

6. 35

6. 03

9. 11

2008

6. 01

9. 78

8. 39

2009

4. 55

4. 81

8. 00

Sources: International Monetary Fund (2010)

Table 2. Indonesia Gross Domestic Product (GDP)

Industrial Sector

GDP (Million IDR)

GDP (%)

Manufacturing Industry

1, 480, 905. 4

26. 38%

Agriculture, Livestock, Forestry & Fishing

858, 252. 0

15. 29%

Trade, Hotels & Restaurants

750, 605. 0

13. 37%

Mining & Quarrying

591, 531. 7

10. 54%

Administration, Government Service, Social Service & Tourism

573, 818. 7

10. 22%

Building Construction

554, 982. 2

9. 89%

Finance, Real Estate & Business Services

404, 116. 4

7. 20%

Transportation and Communication

352, 407. 2

6. 28%

Electricity, Gas & Water Supply

46, 823. 1

0. 83%

TOTAL

5, 613, 442

Sources: Central Board of Statistics (2009)

Table 3. Indonesia Job Field Classification

Industrial Sector

Job Field (people)

Job Field (%)

Agriculture, Livestock, Forestry & Fishing

43, 029, 493. 0

41. 18%

Trade, Hotels & Restaurants

21, 836, 768. 0

20. 90%

Administration, Government Service, Social Service & Tourism

13, 611, 841. 0

13. 03%

Manufacturing Industry

12, 615, 440. 0

12. 07%

Transportation and Communication

5, 947, 673. 0

5. 69%

Building Construction

4, 610, 695. 0

4. 41%

Finance, Real Estate & Business Services

1, 484, 598. 0

1. 42%

Mining & Quarrying

1, 139, 495. 0

1. 09%

Electricity, Gas & Water Supply

209, 441. 0

0. 20%

TOTAL

104, 485, 444

Sources: Central Board of Statistics (2009)

Table 4. Regression Analysis function: Unemployment (Y) determine by

Inflation (X)

Table 5. Regression Analysis function: Unemployment (Y) determine by GDP (X)

Table 6. Pearson Correlation between Inflation Rate and Unemployment Rate

Correlation (Pearson)

Unemployment rate and Inflation, average consumer prices

Pearson Coefficient of Correlation

0. 3101

t Stat

1. 4946

df

21

P(T <= t) one tail

0. 0749

t Critical one tail

1. 7207

P(T <= t) two tail

0. 1498

t Critical two tail

2. 0796

Table 7. Pearson Correlation between GDP and Unemployment Rate

Correlation (Pearson)

Gross domestic product, constant prices and Unemployment rate

Pearson Coefficient of Correlation

-0. 1792

t Stat

-0. 8346

df

21

P(T <= t) one tail

0. 2067

t Critical one tail

1. 7207

P(T <= t) two tail

0. 4134

t Critical two tail

2. 0796

Table 8. Educational Attainment of Unemployment