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United States Producer Price Indexes for Non-Life Insurance
NAICS 524114 and 524126
ISIC 6512 Non-Life Insurance

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Introduction

The U.S. Bureau of Labor Statistics currently publishes Producer Price Indices for two non-life insurance industries:

- NAICS 524114 Direct Health and Medical Insurance Carriers
- NAICS 524126 Direct Property and Casualty Insurance Carriers

This paper discusses the development and maintenance of these indices.

1. Definition of the service being priced

The primary output of these insurance industries is the assumption of risk (transfer of risk from the policyholder) and financial intermediation, which is the investing of someone else's money with the goal of partially offsetting the size of the premium payment.

The policy underwritten by the insurer represents the unique output. The policy lists the coverages for which restitution would be made to the policyholder to cover claims. The amount of risk being transferred to the insurer is clearly stated in terms of covered benefits (and benefits not covered), and it obligates the insurer to pay claims for all such occurrences. Thus, the US PPI defines the output as the transfer of the risk of financial loss from the policyholder to the insurance company. Output can be further defined by the specific types of insurance coverage. The major service lines for each industry follow:

Health and medical insurance
- Managed care medical service plans
- Fee-for-service medical service plans
- Dental insurance
- Vision insurance
- Prescription drug insurance
- Supplemental Medicare
- Long-term care
- Medical expense
- Accident (excludes accidental death or dismemberment which the US considers life insurance)

Property and casualty insurance
- Private passenger auto insurance
- Homeowner's insurance (includes insurance for renters)
- Commercial auto insurance
- Commercial multiple peril insurance
- Worker's compensation insurance
- Medical malpractice insurance
- Product liability insurance
- Inland marine insurance
- Surety insurance
- Fidelity insurance

2. Pricing unit of measure

The operational definition of assumption of risk plus financial intermediation is premium plus rate of return on investment. Investment income is crucially important to the industry and greatly affects their pricing decisions and its inclusion should yield a smoother statistic that would facilitate the regulatory decision-making process. Companies may well reduce premiums when the rate of return increases in response to competitive pressures, as well as raise premiums when the rate of return is lower.

Thus, the price can be expressed as

$$\textbf{Price} = \textbf{Premium} \; (1 + r)$$

where r is the annual or monthly return on the invested portion of the premium for the particular line of insurance that is being priced. This rate is stated as a percentage of all premiums paid.

There are mutual companies whose policyholders are also the stockholders of the company. These companies typically pay out a dividend rebate to the policyholders on an annual basis. In such cases, the dividend would be subtracted from the premium to obtain a net transaction price as follows:

$$\textbf{Price} = \textbf{Premium} \; (1 + r) - \textbf{Dividend}$$

BLS also publishes a separate set of indices that measures only the changes in premiums for the property and casualty insurance industry. These indices are calculated using the same premium data reported for the primary industry index. Originally created at the request of the industry as an alternative measure of price trends, these indices are currently also used by BEA for deflation purposes as noted later in section 6 of this paper.

3. Market conditions and constraints

a. Size of industry

The following table provides size statistics for all direct non-life insurance carriers based on the 2007 Economic Census.

Industry	Number of establishments	Revenue ($1000)
Direct property and casualty insurance carriers	13,659	$421,810,032
Direct health and medical insurance carriers	4,523	$497,569,749
Direct title insurance carriers*	6,906	$17,214,203
Other direct insurance carriers (except life)*	472	$5,937,269

*BLS does not calculate an index for title insurance, which is a separate industry under NAICS

b. Special conditions or restrictions

Many insurance companies are part of a much larger aggregation called an insurance "group." An insurance group refers to all companies that are affiliated with each other through the same ownership. An insurance group may operate in multiple insurance industries with separate companies providing property and casualty, health, and/or life insurance. Even individual companies may provide more than one major type of insurance. Many health insurance companies also provide life insurance through separate divisions. Thus, industry revenues reported by the Census will cross insurance-related industries. For example, in addition to property and casualty premiums and investment income, total revenue reported for the property and casualty industry includes premium revenue for health, life and other insurance. For PPI, premiums must be reassigned based on the line of insurance, not the type of company, for purposes of index weighting.

This industry structure also impacts sampling. Insurance groups and companies (not affiliated with a group) are sampled at the headquarters level. Therefore, they must be separated into smaller units to represent each of the different insurance industries. Using this strategy, groups or companies may have a chance of selection in more than one industry.

c. Record keeping practices

Typically, pricing data can be obtained at the group or company headquarters. Due to the nature of mandatory financial reporting to the state insurance commissions, the requested price components are readily available. In particular, the rate of return for property and casualty is reported for each line of insurance (auto, homeowners, etc.), whereas it is only reported on an aggregate level for health and medical insurance. BLS also obtains data from the National Association of Insurance Commissioners to fill in gaps as needed when an establishment does not update the rate of return.

4. Standard classification structure and detail related to the area

NAICS Definition

According to the 2007 North American Industry Classification System:

- NAICS 524114, Direct Health and Medical Insurance Carriers, includes establishments primarily engaged in initially underwriting (i.e., assuming the risk and assigning premiums) health and medical insurance policies. Group hospitalization plans and Health Maintenance Organizations (HMO) establishments (except those providing health care services) that provide health and medical insurance policies without providing health care services are included in this industry.

- NAICS 524126, Direct Property and Casualty Insurance Carriers, includes establishments primarily engaged in initially underwriting (i.e., assuming the risk and assigning premiums) insurance policies that protect policyholders against losses that may occur as a result of property damage or liability.

Comparison to ISIC Rev.4 Definition

NAICS 524114 and NAICS 524126 most closely compare to ISIC Class 6512 Non-Life Insurance, which includes provision of insurance services other than life insurance:

- accident and fire insurance
- health insurance
- travel insurance
- property insurance
- motor, marine, aviation and transport insurance
- pecuniary loss and liability insurance

NAICS 524127, Title Insurance, and NAICS 524128, Other Direct Insurance, would also be covered by ISIC 6512. Included in NAICS 524128 are warranty insurance carriers and bank deposit insurance carriers. The US PPI does not cover these two industries (i.e. NAICS 524127 & 524128).

North American Product Classification System

The following table provides the insurance services as defined by the North American Product Classification System. The services listed are those for which there is trilateral agreement between the United States, Canada, and Mexico:

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NAPCS Code	Title
1.7	Insurance services
1.7.1	Insurance underwriting services
1.7.1.1	Underwriting services for life insurance policies and pensions
1.7.1.2	Underwriting services for health and accident insurance
1.7.1.3	Underwriting services for property and casualty insurance
1.7.1.3.1	Underwriting services for surety bonds and related products
1.7.1.3.1.1	Underwriting services for surety bonds
1.7.1.3.1.2	Underwriting services for fidelity insurance
1.7.1.3.1.3	Underwriting services for credit protection insurance
1.7.1.3.1.9	Underwriting services for surety bonds and related products, nec.
1.7.1.3.2	Underwriting services for vehicle property and liability insurance policies
1.7.1.3.3	Underwriting services for property and liability insurance policies, except vehicle
1.7.1.3.3.1	Underwriting services for agricultural multiple peril insurance policies
1.7.1.3.3.2	Underwriting services for homeowners multiple peril insurance policies
1.7.1.3.3.3	Underwriting services for commercial multiple peril insurance policies
1.7.1.3.3.4	Underwriting services for transportation insurance policies
1.7.1.3.3.5	Underwriting services for fire insurance policies
1.7.1.3.3.6	Underwriting services for burglary and theft insurance policies
1.7.1.3.3.7	Underwriting services for glass and window insurance policies
1.7.1.3.3.8	Underwriting services for earthquake insurance policies
1.7.1.3.3.9	Underwriting services for property and liability insurance policies, nec.
1.7.1.3.4	Underwriting services for general liability insurance policies
1.7.1.3.4.1	Underwriting services for product liability insurance policies
1.7.1.3.4.9	Underwriting services for general liability insurance policies, nec.

Comparison to CPC Ver.2

The following table maps the NAPCS product codes to the CPC Ver.2 structure for classes 7132 and 7133.

CPC code	Title	NAPCS Code
7132	**Accident and health insurance services**	
71321	Accidental death and dismemberment insurance services	NA
71322	Health insurance services	1.7.1.2
7133	**Other non-life insurance services (excluding reinsurance)**	
71331	Motor vehicle insurance services	1.7.1.3.2
71332	Marine, aviation, and other transport insurance services	1.7.1.3.3.4
71333	Freight insurance services	NA
71334	Other property insurance services	1.7.1.3.3.1 1.7.1.3.3.2 1.7.1.3.3.3 1.7.1.3.3.5 1.7.1.3.3.7 1.7.1.3.3.8
71335	General liability insurance services	1.7.1.3.3.1 1.7.1.3.3.2 1.7.1.3.3.3 1.7.1.3.4.9
71336	Credit and surety insurance services	1.7.1.3.1.1 1.7.1.3.1.3
71337	Travel insurance services	NA
71339	Other non-life insurance	1.7.1.3.1.2

The US PPI includes accidental death and dismemberment in the life insurance industry. There is no NAPCS code for this service. In addition, there are no specific NAPCS codes for freight insurance or travel insurance. Multiple peril insurance can include both property and liability coverage, so those particular NAPCS products correspond to CPC codes for both general liability and property insurance.

5. Evaluation of standard vs. definition and market conditions

For health and medical insurance, there is very little detail in the NAPCS product listing at the level of trilateral agreement. Significant US detail was added in the 2007 Economic Census that more closely matches the current US PPI publication structure for the health and medical insurance industry. The table at the top of the next page provides this publication structure, indicating the detail that was added.

Index code	Index title	US Census detail
524114	Direct health and medical insurance carriers	
524114P	Primary services	
5241141	Medical service plans	
524114101	Comprehensive medical service plans	added in 2007
52411410101	Group managed care medical service plans	to be added in 2012
52411410102	Group fee-for-service medical service plans	to be added in 2012
52411410103	Individual comprehensive medical service plans	to be added in 2012
524114103	Non-comprehensive medical service plans	added in 2007
52411410301	Dental service plans	to be added in 2012
52411410302	Supplemental Medicare service plans	to be added in 2012
52411410303	Other medical service plans	No detail*
5241142	Health insurance	No detail*
524114SM	Other receipts	

*services are aggregated in NAPCS

For property and casualty insurance, some US detail was added to the 2007 Economic Census to further define vehicle insurance and liability insurance. The table below provides the US PPI publication structure for the property and casualty industry indicating the detail that was added.

Index code	Index title	US Census detail
524126	Direct property and casualty insurance carriers	
524126P	Primary services	
5241261	Private passenger auto insurance	added in 2007
5241262	Homeowners insurance	matches NAPCS
5241263	Commercial auto insurance	added in 2007
5241264	Non-auto liability insurance	
524126402	Medical malpractice insurance	added in 2007
524126403	Product liability and other non-auto liability insurance	matches NAPCS
5241265	Commercial multiple peril insurance	matches NAPCS
5241266	Workers compensation insurance	added in 2007
5241267	Other property and casualty insurance	No detail*
524126SM	Other receipts	

*includes all remaining NAPCS services for property and casualty insurance

6. National accounts concepts and measurement issues for the area related to GDP measurement

An alternative definition of insurance output states that primary output is the "pooling" of risk rather than the assumption of risk. Pooling of risk defines the insurer as an intermediary between various policyholders where the insurer's function is to collect premiums, which are invested and earn interest, and disburse them to claimants. In this view, the service provided by insurance carriers are the set of activities in managing the risk pool; the policyholders retain the risk in this model.

Using this output definition, the price would be expressed as

$$\textbf{Price = Premiums (1 + r) – Claims}$$

Currently, the U.S.Bureau of Economic Analysis (BEA) uses this definition in the National Income and Products Accounts, which is consistent with the 2008 System of National Accounts.

The decision by BLS to not adopt this model was made only after extensive research and discussion with the industry. The operational definition of assumption of risk plus financial intermediation was premium plus rate of return on investment. While there was initial reluctance among industry representatives to accept the rate of return price component, they ultimately agreed with our definition. The difficulty was of a practical nature in that the state regulatory authorities were accustomed to thinking of premium as equaling price. The introduction of an official price series based on a different price definition introduced uncertainty to the industry. Eventually, there was the realization that investment income was crucially important to the industry and greatly affected their pricing decisions and its inclusion should yield a smoother statistic, facilitating the regulatory decision-making process.

As noted earlier, BLS publishes a separate price index that measures only the changes in premiums for property and casualty insurance. This index is calculated using the same premium data reported for the primary industry index and the same publication structure. BEA uses this index to deflate the export and import insurance premiums in the GDP accounts for the property and casualty industry.

7. Pricing method(s) and criteria for choosing various pricing methods

Premiums

To track premium movement, companies provide estimated premiums for "frozen" policies. This is an actual policy selected by probability where the premium determining characteristics are held constant, while the policy is repriced on an annual or semi-annual basis. The insurance company estimates the current premium for this "frozen" policy by using current charges applied to the policy characteristics of the policy. This premium remains unchanged until the policy is priced again the following year.

In order to hold inflation-sensitive characteristics constant for property and casualty insurance, periodic adjustments are made to account for inflation. For homeowners insurance, the dollar limit of coverage is adjusted annually to account for construction price inflation. The assumption is that the policyholder is insuring to secure a constant flow of services from the insured property. If there is price inflation affecting the cost of repair or replacement of the damaged property, the coverage limit should be escalated to reflect this increase. This adjustment is made annually on the anniversary date of the policy. This reflects what actually occurs; companies make these coverage adjustments at the time of policy renewal. As the index is tracking several thousand policies selected on a probability basis, there is a spread of policy anniversary dates throughout the year. This method of pricing smoothes price behavior.

The source used for the escalation is dependent upon the insurance company. If the company cannot make a recommendation as to how the inflation-sensitive policy characteristics should be adjusted, PPI decides the appropriate index to use. For example, the Building Cost Index calculated by the Engineering News-Record is used to escalate the coverage limit for homeowners insurance. A different procedure is used for Worker's Compensation Insurance. The workforce in the group is held constant (same number of people in the same jobs), but the wage rates are adjusted to account for general wage inflation. In this case, the Bureau of Labor Statistics' Employment Cost Index is used.

An alternative to pricing frozen policies is to follow the selected policy over time. Companies are asked to provide the actual premium charged to the policyholder and to identify any modifications to the policy each year on the anniversary (or renewal) date. Any changes in benefits over time must be factored out so that index movements reflect only changes in price and not any additional benefits. To maintain constant quality, the companies must be able to provide the value of the risk change associated with any change to the policy characteristics.

Most respondents use the method in which they price frozen policies, but some use the alternative. They can choose whichever method is easiest for them as long they are able to provide the required information that meets the needs of the US price indices.

Return on investments

The investment rate of return is calculated by all insurance companies as a percentage of the premium. For property and casualty insurance, all companies prepare an annual report that includes this calculation. The report provides the investment rate of return by insurance line calculated as a percent of premium. As with the inflation-sensitive policy characteristics, the rate of return is updated annually for each priced item on the policy anniversary date.

8. Quality adjustment methodology

Risk change

The fundamental issue in pricing insurance services over time is the ability to identify and adjust for changes in risk. For changes in explicitly endogenous risk factors such as changes in coverage or deductibles, companies have suitable cost data to allow for meaningful cost based quality adjustment.[1]
However, for changes in exogenous risk factors that go beyond the scope of policy negotiations, such as an increased incidence of theft or a severe flu season, company specific data would not be sufficient to definitively quantify risk. Only outside data sources will be able to identify short-term vs. long-term changes in risk.

Such an outside data source is used in the quality adjustment of private passenger auto insurance where risk changes occur even though the age of the insured auto remains the same. To keep the age constant, the model year of the auto is updated once a year to the next model year. For example, a 1996 Honda Accord is changed to a 1997 model. However, changing the model year can also move the auto into a different risk category known as a symbol group. Insurance companies are unable to assess this risk change on their own, but a valuation can be obtained from the

[1] Examples of these kinds of factors include the addition of a terrorism clause to property and casualty insurance policy and, for health insurance, the removal of lifetime maximums based on Health Care Reform.

Insurance Services Office (ISO). This organization pools risk information industry-wide, producing data which are broader in scope than any that one company could gather on its own. The ISO assigns autos to symbol groups based on their risk characteristics. For PPI purposes, the ISO provides the value of risk change for every auto included in the index. The ISO monitors the symbol group that is assigned to an auto and the particular risk associated with that symbol group. When an auto moves into a different symbol group, ISO assigns a value to the risk change that occurs. This value is then used to explicitly quality adjust the premium used in the PPI. Therefore, the risk changes are not reflected in the index as price changes. Below is an example of how the ISO risk data is used.

Model year	Avg. risk change-comp.	Avg. risk change-coll.
2005	1.68%	0.93%

1) Chevy Impala 2004 to 2005. Symbol changed and the collision (coll.) premium increased $25 due to the symbol change. Average ISO risk change for collision 2005= 0.93%. 0.93% of $25=$0.2325, reflects risk change; 99.07% of $25=$24.7675, reflects price change.

2) Chevy Impala 2004 to 2005. Symbol changed and the comprehensive (comp.) premium increased $40 due to the symbol change. Average ISO risk change for comprehensive 2005 = 1.68%. $40 x 1.68%= $0.6720, so the risk change =$0.6720 and $40-0.6720 = $39,328, the price change.

New item bias

Another issue related to quality is the new item bias that can be present whether pricing frozen or actual policies. However, this bias may be especially problematic when pricing a frozen policy. Over time, this policy may no longer be representative. Mandated coverages may change or new insurance products may be introduced. Although bias may be not be as prevalent when following an actual policy, it can occur if the general population has changed their preferences for the type of insurance product that they purchase or if the policy represents a smaller portion of the company's business.

To minimize new item bias, the insurance industries are resampled more frequently than other industries in the PPI. In addition, many mandated coverage changes are captured during normal monthly pricing activities.

9. Evaluation of comparability with turnover/output measures

Every five years, the U.S. Census Bureau publishes revenue data for the non-life insurance industries in the Economic Census. Premium data that corresponds to the lowest level detail of the PPI for property and casualty insurance is currently available. For health and medical insurance, premium data will be available for the lowest level PPI detail in 2012. For both industries, investment income data are published for the six-digit level only.

The Census Bureau also publishes quarterly revenue data for the insurance industries. However, it is published at the four-digit NAICS 5241 level only.

10. Summary

The chosen methodology for the US PPI for non-life insurance industries closely approximates the conceptual model of the assumption of risk. Despite limitations such as new item bias, routine index maintenance procedures allow the industry analyst to make adjustments for changes in industry regulation and mandated coverages in order to maintain constant quality. In addition, industry pricing and record keeping practices enable respondents to report prices with the least amount of burden.