

Intervention Analysis in Rehabilitation

Abstract

Rehabilitation outcomes are an important aspect of state vocational rehabilitation agencies operations because funding must be determined by what positive outcomes (26's) can be achieved, on a lag basis each year. To gauge this, managers look at monthly productions (26's) to determine where they were at the same time the previous year and how much production they deem to meet their goals for the end of the year.

Although productions growth has been driven by the increase and population and result in hiring of new counselors at the Texas Rehabilitation Commission (TRC), decreases in budget will likely drive those 26's down.

Introduction

New policies in vocational rehabilitation impacting client choice and presumed eligibility has substantial potential in increasing the overall number of persons served. What this means for outcomes, however, remains to be seen. Traditionally, applicants would need to go through a number of evaluations and diagnostics to be determined eligible. This may have included, at one time, determining before eligibility, a plan of services, at least informally.

The eligibility criteria before the Rehabilitation Act Amendments of 1992¹ included (1) the presence of a physical or mental disability which constitutes or results in a present substantial handicap to employment; and (2) reasonable expectation that vocational rehabilitation services will benefit the individual in terms of employability. The new criteria include: (1) presence of a disability which is considered a physical or mental impairment which for the individual constitutes or results in a substantial impediment to employment; (2) generally it is presumed that an individual can attain an employment outcome unless it is demonstrated by clear and convincing evidence that the individual is not capable of not obtaining an employment outcome; and (3) the individual requires vocational rehabilitation services to prepare for, enter, engage in, or retain an employment outcome.

TRC analyzed the impact to the implementation of the Rehabilitation Act Amendments in the state of Texas, the third most populous state in the United States, by creating time-series models for the 8 year period that distinguish between the secular trend and intervention effect during the 8 months after the change. The changes in implementation and procedures for use of outcome status's were impacted. These status's include 08, found ineligible status 26 rehabilitated status 28 not rehabilitated status 30 case closed before implementation of a rehabilitation plan.

Background

With respect to eligibility for the vocational rehabilitation program, the Amendment specify the following : A. Eligibility criteria. (Section 102 (a)(1)) The individual meets the definition of an "individual with a disability", i.e., an individual who has a physical or mental impairment which constitutes or results in a substantial impediment to employment and can benefit in terms of an employment outcome from vocational rehabilitation services, and the individual requires vocational rehabilitation services to prepare, enter, engage in, or retain gainful employment.

Presumption of benefit (Section 102 (a)(4)).

The amendments make it clear that there is presumption that an individual can benefit in terms of an employment outcome from vocational services thus, all applicants for VR services are presumed to meet the second criteria for program eligibility unless a state agency can rebut this presumption. To rebut this presumption, the state agency must demonstrate by clear and convincing evidence that an individual is incapable of benefiting from VR services in terms of an employment outcome. Prior to determining that an individual is incapable of benefiting from services due to the severity of the disability, the designated state agency must first conduct an extended assessment (evaluation).

Timelines (Section 102 (a)(5)).

The State agency must make eligibility determinations for: within a reasonable period of time, not to exceed 60 days after the individual has submitted an application for services: unless exceptional and unforeseen circumstances exist that are beyond the control of the state agency and the individual concurs with the extension, or and extended evaluation is required to determine eligibility.

Due to these new rehabilitation act amendments specifically those addressing eligibility and the need to determine eligibility within 60 days, counselors have accepted a larger number of individuals for whom they may not have an individual written rehabilitation plan in mind at the time of acceptance for services. Counselors have also determined less individuals ineligible for services. At the time that eligibility is determined counselors may either write a plan of services and have two possible outcomes: rehabilitated; or not rehabilitated. If a counselor and a client do not write a plan of services and the individual is closed after acceptance, the status 30 outcome is used.

An assessment of the unique strengths, resources, priorities, interest and needs to make the determination of the goals, objectives, nature and scope of rehabilitation services should be included in the IWRP by the counselor. Immediately after the counselor determines eligibility, they begin a comprehensive assessment limited to information that is necessary to identify the rehabilitation needs of the client and to develop the Individual Written Rehabilitation Plan (IWRP). To the maximum extent possible, the primary source of information will include existing information which can be provide by the client or the family of the client. The counselor should make every effort to explore what, if any existing medical and other reports that can made available at the time of application or initial interview. Often counselors, prior to the intervention, needed to purchase diagnostics and evaluations in order to determine both eligibility and the extent of the IWRP..

Because of the presumption that VR services will benefit the person in terms of employment outcome after a personal capacities, interests, and experience assessment are performed to the degree needed a counselor and client (a person accepted for services) may not be able to arrive at a plan of services. This would result again in a status 30 closure (closed before the IWRP).

Methods

This study uses time-series intervention methodology by Box and Tiao² to examine the amendment's impact on outcome differences over time for status 08, 26, 28, and 30. It examines 97 months of outcome data from October 1986 to April 1994 (7 months after the rehabilitation act amendments were implemented) to quantify the abrupt impact of the amendments - while distinguishing separately those upward and downward, secular trends occurring before the imposition of the Rehabilitation Act Amendments.

Model

The time series model uses monthly information to determine a "before" base line level "after" effect, as a "quasi-experimental" design described by Campbell and Stanley³. Evaluation model considers the data collected at equal intervals is auto-correlated, i.e., correlated with previous data points.

Errors (residuals) resulting from the often used ordinary least squares (OLS) regression are often times auto-correlated, a major violation of the OLS assumption. OLS estimation of parameters becomes inefficient, providing estimates without minimum errors. In contrast, the Box- Tiao intervention analysis is based on Box-Jenkins auto regressive, integrated, moving average (ARIMA) model that specifically that considers the time-dependent nature of the data to produce efficient estimation of relationships including interventions.

Data

Outcome status information by counselor, by region, and by state, on a monthly basis is available on the TRC Supervisors' Composite Report (S5334)^{4, 5, 6, 7, 8, 9, 10, 11, 12}. The aggregated outcome information from these reports was entered using SAS data sets, because the monthly data is stored electronically.

The outcome reports contained in the supervisor's composite report contain separate information on outcomes as well as those served and other production measures. Information was only examined in this study for outcomes and those served for state total over time.

Analysis

The dependent variable Z^t was computed as a 12th order difference between the logarithms of the monthly observations, Y^t and Y^{t-12} . Trends effects were simply modeled as the constant in the equation, with all observations having a value of 1. Intervention effects from model using a dummy vector where I_t , $t \leq 90$ (October 1986 - September 1993) 1, $T \geq 91$ (October 1993 - April 1994).

Computations were performed using the SAS/ETS¹³ statistical computer software package. The program uses a method based on maximum likelihood to estimate parameters after obtaining initial values from conditional least squares.

Table 1 - Outcomes (and Change) over Time

	Closure Status			
	<u>08</u>	<u>26</u>	<u>28</u>	<u>30</u>
FY86	10,753 (.)	15,173 (.)	6,483 (.)	253 (.)
FY87	10,897 (1.34%)	14,725 (-2.95%)	6,643 (2.47%)	287 (13.44%)
FY88	12,864 (18.81%)	15,174 (3.05%)	8,306 (25.03%)	383 (33.45%)
FY89	13,845 (7.63%)	16,618 (9.51%)	9,565 (15.16%)	464 (21.15%)
FY90	11,983 (-13.45%)	16,767 (0.90%)	9,262 (-3.17%)	472 (1.72%)
FY91	11,961 (-0.18%)	16,588 (-0.11%)	9,579 (3.42%)	484 (2.54%)
FY92	12,526 (4.72%)	16,486 (-0.61%)	9,675 (1.00%)	407 (-15.91%)
FY93	14,740 (17.68%)	18,776 (13.89%)	19,728 (103.91%)	659 (61.92%)
FY94*	12,525 (-15.03%)	18,407 (-1.97%)	12,410 (-37.09%)	3,448 (423.22%)

*Unofficial Forecast

Results

Number of outcomes

Table I presents the number of 08 (ineligible), the number of 26 closures (rehabilitated), 28 closures (not rehabilitated), and the number of status 30 closures (no plan initiated) outcomes and percentage change by total during the 96 months observation period, summarized on an annual basis beginning October, 1985.

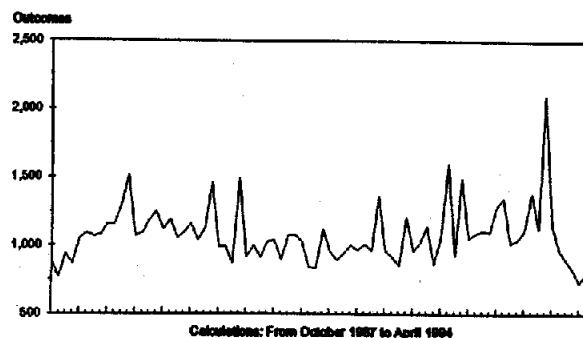
The trends (for outcome), seasonal, and auto correlation nature of the monthly data can be seen in figures 1, 2, 3 and, 4, with the total outcomes for each of the status's before and after the implementation of the rehabilitation act amendments. The estimated perimeters for both models based on the monthly data, depict what can be seen in figure corresponding figures and tables in addition to the declines in status 08 closures and increases in status 30 closures seasonality can be seen by the spikes in status 28 closures around September, and spikes in status 26 closures in October.

Applicants found Ineligible

The value of the intervention parameter is most manifest from October 1993 on. Looking at the 7 subsequent months equals 46.9 percent. Using regression analysis, the adjusted R^2 for status 08 closures over time is 0.8470. A September indicator was utilized because of the large number of status 08 closures each year in the month of September. The period of differencing was one. The autoregressive factor parameter is $1-0.2965B^{12}$. The moving average factor is $1-0.63854B^1$. The overall regression factor is 477.4166. The X^2 scores were all insignificant at lags 6, 12, 18, and 24.

While status 08 closures decrease over time, status 30 closures increase over time. The correlation coefficient over time starting October 1993 (time of intervention) equals -0.61. Therefore, the presumption of eligibility detracts from status 08 closures, forcing counselors to close more cases in status 30 (after acceptance).

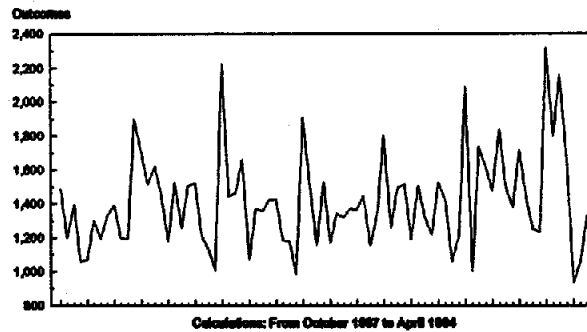
STATUS 08



Persons Rehabilitated

The following model was estimated for persons rehabilitated. An October indicator was utilized, because of the large number of status 26 closures each year for that month. The autoregressive factor parameter is $1-0.38743B^{12}$. The moving average factor is $1-0.92977B^1$. The overall regression factor is 510.0634. The X^2 scores are all insignificant at lags 6, 12, 18, and 24.

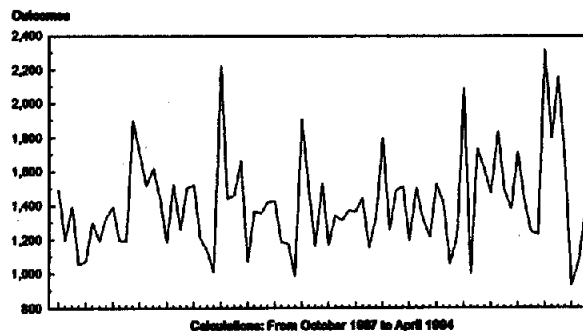
STATUS 26



Persons not rehabilitated

The following model was persons not rehabilitated. A September indicator was utilized because of the large number of status 28 closures each year for that month. The autoregressive factor is $1-0.4916B^{12}$. The moving average factor is $1-0.76598B^1$. The overall regression factor is 723.1772. The X^2 scores are all insignificant at lags 6, 12, 18, and 24.

STATUS 28



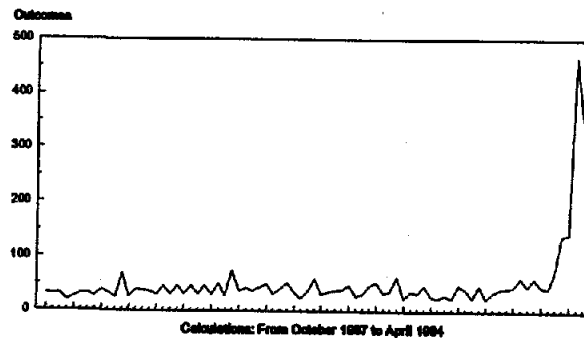
Persons with whom a plan was not written

The following model was estimated for status 30 closures during the study period. A mean term of 124.217174 is used. The autoregressive factor is $1-0.97336B^1$.

Analysis was also done after intervention, using OLS regression. The total $R^2 = 0.2926$. analyzing status 30 closures from October 1993 to April 1994. The R^2 is even higher when April

is removed (0.51). As mentioned earlier, correlation with status 08 closures of -0.61 demonstrates the major impact of the Rehabilitation Act Amendments on these two statuses; presumption of eligibility.

STATUS 30



Discussion

Despite downward trends in 08 closures and upward secular trends in status 30 closures and continued upward secular trends in 26 and 28 closures of a seasonal nature the rehabilitation act amendments are statistically significant for increases in outcomes for all examined aspects of rehabilitation outcomes. The estimated declines in total number of status 08 closures (15.03 percent), status 30 closure increases (423.22 percent) can be directly attributed to the Rehabilitation Act Amendments. The observed increase in 30 closures was directly related to a decrease in 08 closures at the same time that counselors accepted applicants for services, therefore decreasing the number of those applicant found ineligible there may have still been a number of plans not agreed to by both the counselor and the client (the person recently accepted for services in status 10 therefore status 30 closures were directly proportional to the decreasing status 08 closures after the intervention. While there is dramatic seasonality in status 26 closures in the month of October and status 28 closures in the month of September, it remains to be seen whether the Rehabilitation Act Amendments had any impact on 26 and 28 closures.

Using the estimated total percentage affects of the Rehabilitation Act Amendments can be used to project outcomes during the twelve month period from October 1993 to September 1994 in the state of Texas the following changes in outcome would be seen : 1) Two thousand two hundred and fifteen fewer 08 closures over the fiscal year; 2) Two Thousand seven hundred and eighty-nine more status 30 closures in fiscal year 94 than in fiscal year 1993; 3) without decreases in funding in fiscal year 1994 or other exogenous variables, 369 less 26 closures, and 7,318 less 28 closures would be seen.

As far as the impact of the amendments is concerned for the state of Texas these estimates are obviously conservative, unofficial, and solely the mathematical projections of the author..

Conclusions

The overall conclusion of this study is that the Rehabilitation Act Amendments charge counselors in the state of Texas with accepting more applicants for home plans who are not informally thought of or written out. The increase in status 30 closures and decreases 08 closures is proportional and was best modeled using regular linear regression (ordinary least squares). For status 26 closures October production is still a good indicator of the yearly production. For status 28 closures September production is still a good indicator of overall yearly production. The overall benefits of the Rehabilitation Act Amendments will be to persons with disabilities.

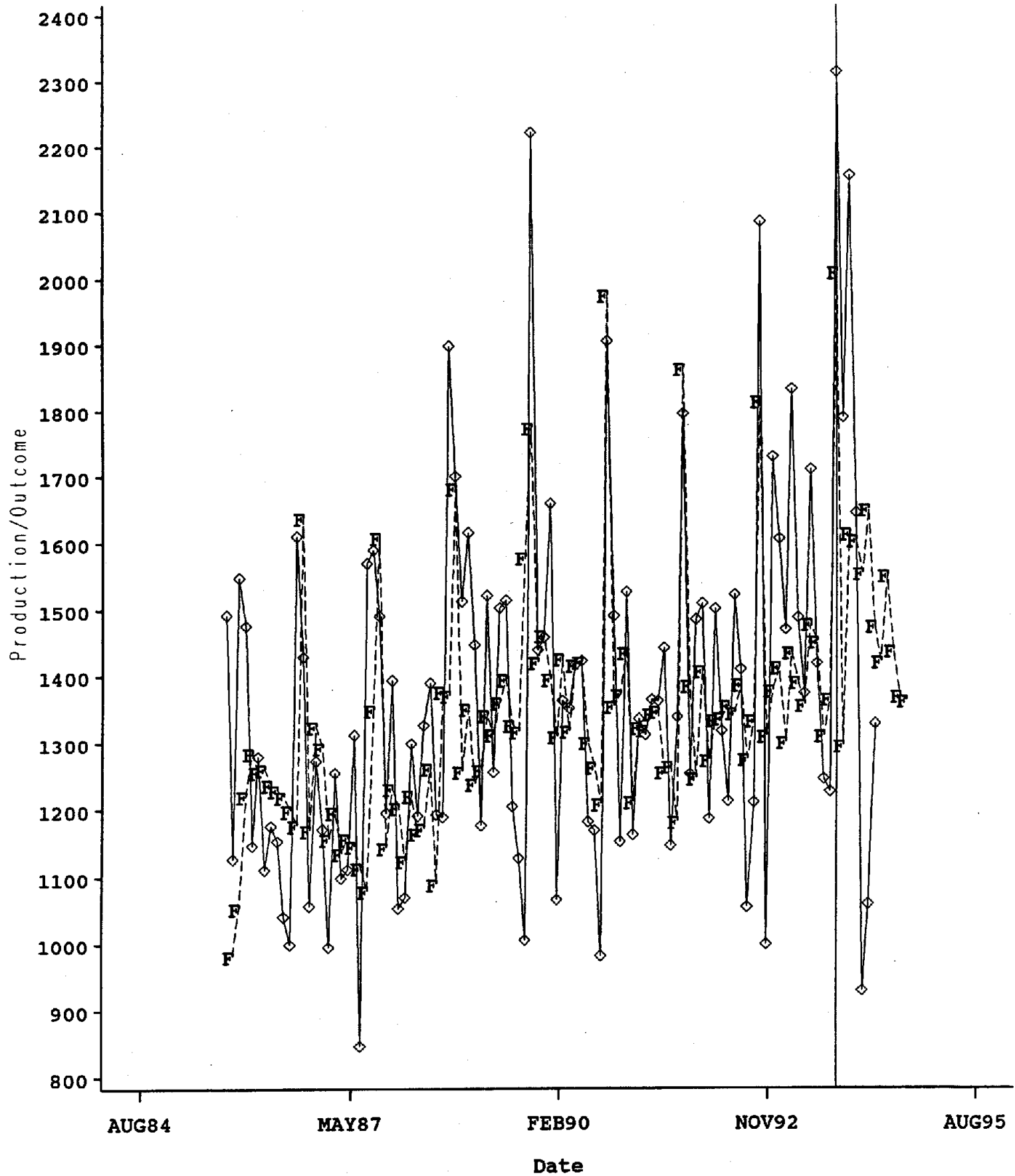
Acknowledgments

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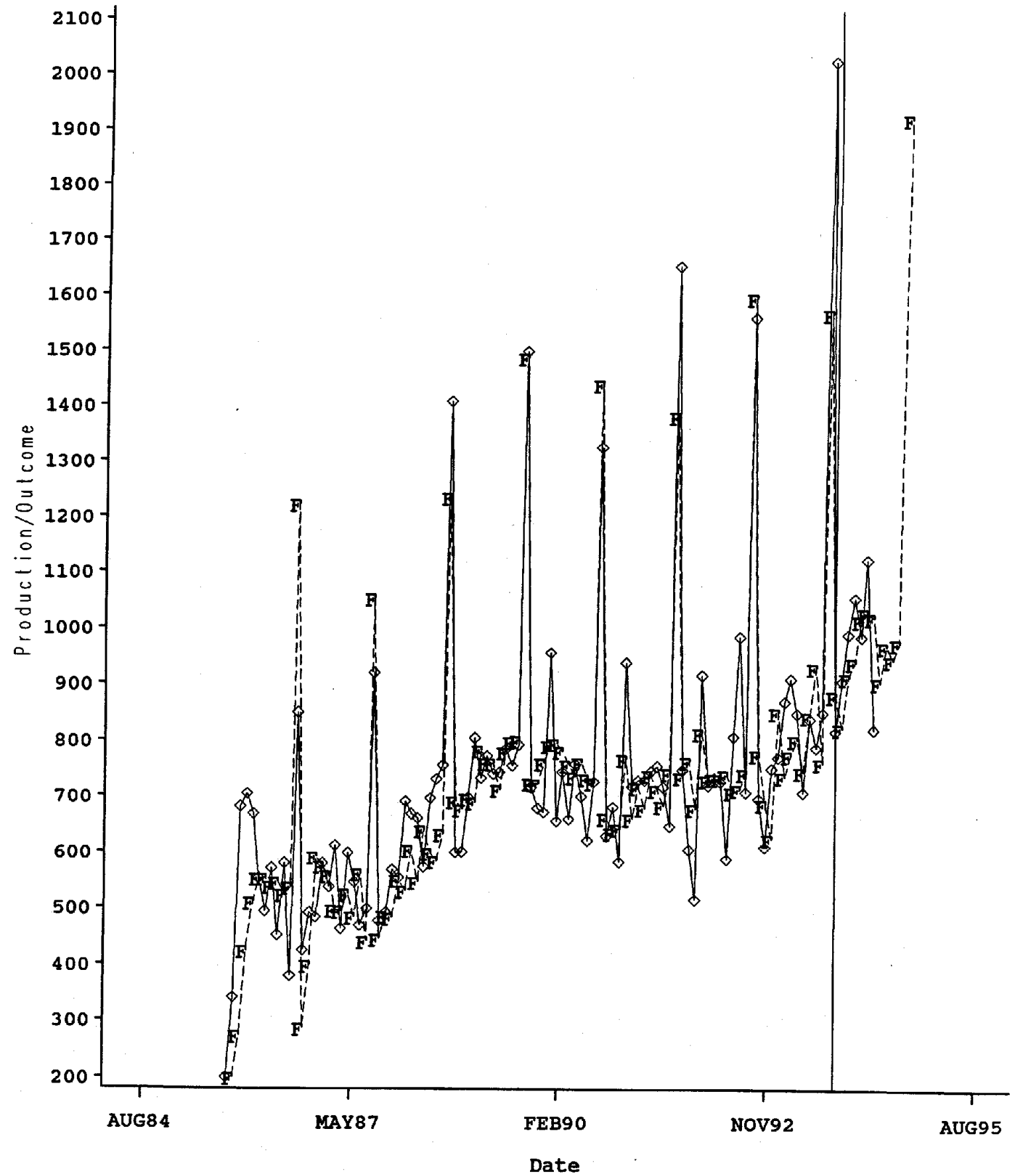
References

- United States Department of Education. The Rehabilitation Act of 1973 as Amended.
- Tiao, G.C., & Box, G.E.P. Modeling multiple time series with Applications. Journal of the American Statistical Association, 1981; 76:802.
- Campbell, D.T. & Stanley, J.C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally College Publishing Co., 1966.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1986.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1987.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1988.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1989.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1990.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1991.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1992.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1993.
- Texas Rehabilitation Commission. Supervisors Composite Report: Fiscal Year 1986. Austin, TX: State of Texas, 1994.
- SAS Institute. SAS/ETS User's Guide. Cary, NC: SAS Institute, 1988.

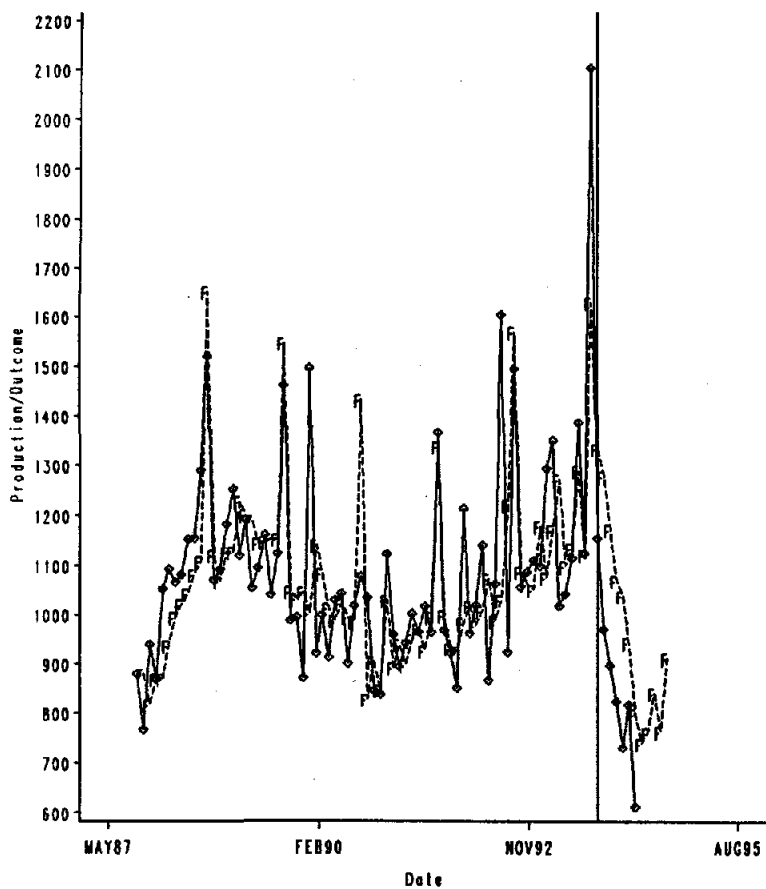
26 Closures



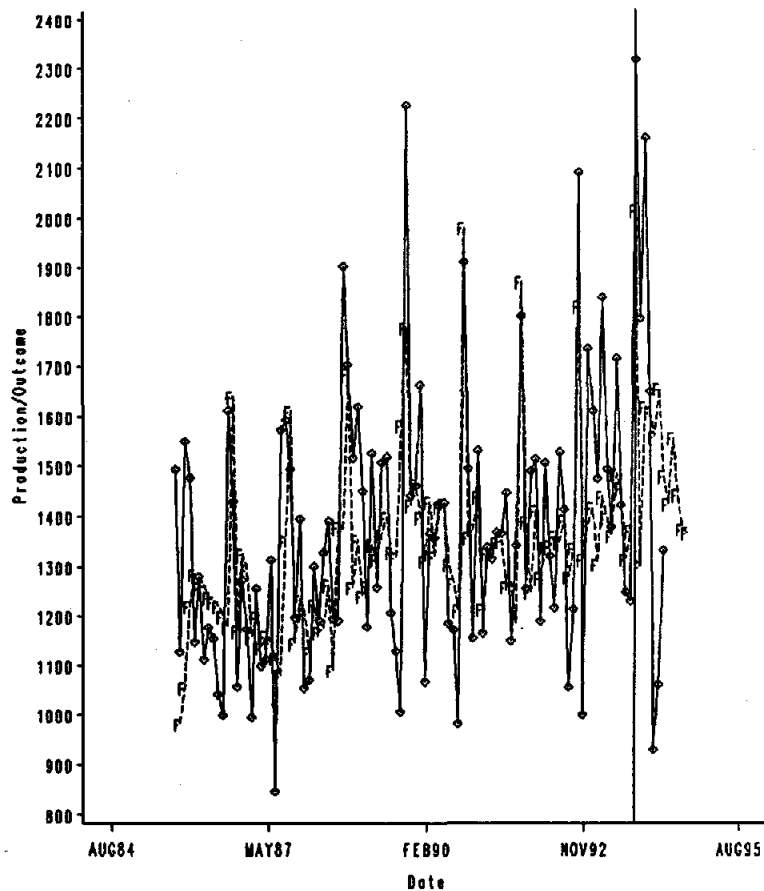
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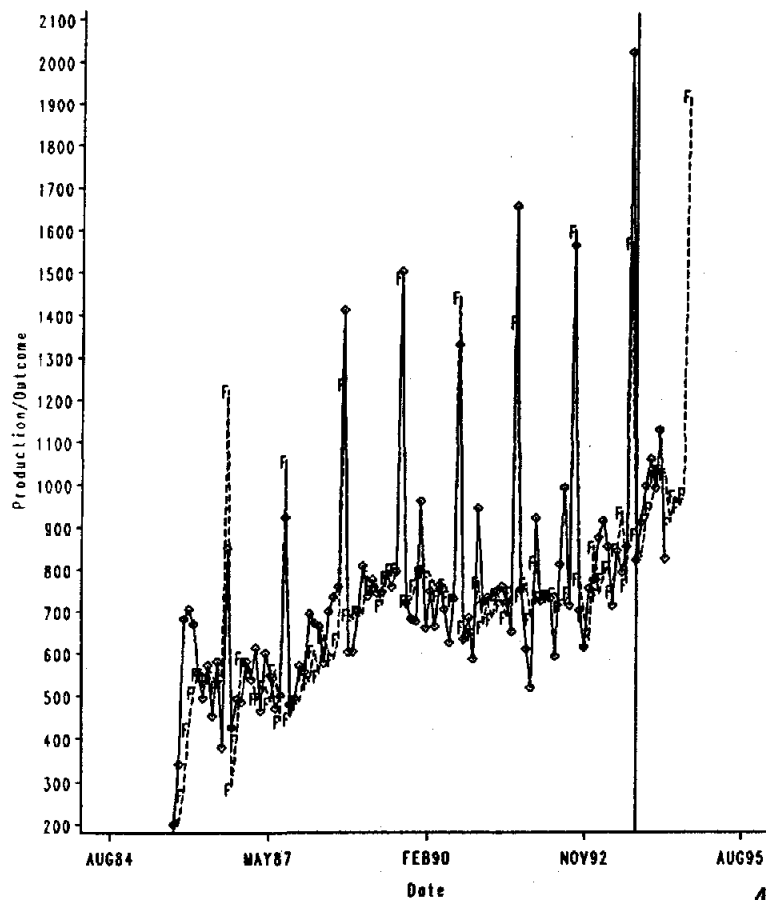
08 Closures



26 Closures



28 Closures



30 Closures

